

# The impact of corporate social responsibility on firm risk during the COVID-19 pandemic

Evidence from the Netherlands

11/20/2023

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MASTER THESIS

## **Acknowledgements**

This master thesis is the final product of my Master of Science in Business Administration with a specialization in Financial Management at the University of Twente. My gratitude goes out to my two supervisors: dr. Xiaohong Huang and dr. Marcos Machado. As my first supervisor, dr. Xiaohong Huang helped me set the scope for this research and provided valuable feedback along this journey. As my second supervisor, dr. Marcos Machado provided feedback that allowed me to improve the content of this thesis. I would like to use this opportunity to thank my wife, for her continuous support during both my bachelor's and master's degree. This gratitude is extended to my family and friends, who always encouraged me during this research.

Michiel Jongejan

Hengelo, November 2023

## **Abstract**

In this thesis, we examine the relationship between corporate social responsibility (CSR) and firm risk in Dutch listed firms during the 2018-2021 period. We develop and assess two hypotheses which are based on both empirical evidence and the agency-, stakeholder-, and legitimacy theory. To test whether CSR affected firm risk, and if this relationship changed due to the COVID-19 pandemic, we conduct ordinary least squares regressions with data gathered from the Thomson Reuters Eikon database and the Yahoo Finance database. In line with the literature, we find a significant negative relationship between CSR engagement and total firm risk, and a significant negative relationship between CSR engagement and idiosyncratic firm risk after controlling for various firm characteristics. No evidence was found for a change in the relationship between CSR and firm risk due to the COVID-19 pandemic. Concluding, this study suggests that Dutch listed firms can contribute to a better tomorrow while also reducing firm risk.

**Keywords:** Corporate social responsibility, CSR, firm risk, total firm risk, systematic firm risk, idiosyncratic firm risk, agency theory, stakeholder theory, legitimacy theory, COVID-19

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# Chapter 1: Introduction

This chapter serves as an introduction to corporate social responsibility (CSR) as well as the problem statement relating to the COVID-19 pandemic. Section 1.1 covers the background of CSR, and the effects of CSR on firms. Section 1.2 contains the problem statement that includes the motivation for this research and is concluded by formulating and stating the research question of this thesis.

## 1.1 Background of Corporate Social Responsibility

CSR is a topic that is increasingly focused upon in studies that focus on management and economics (Pimentel, Branca, & Catalao-Lopes, 2016). This increased attention on the role of firms in society fits a global trend of sustainable development, with the members of the United Nations agreeing to chase sustainable development goals (United Nations, 2015), and the European Union aiming to make Europe the first climate neutral continent by 2050 (European Commission, 2019).

There are multiple definitions for CSR given in literature. The definition of CSR that is proposed by Sarkar and Searcy (2016) after a quantitative analysis of 110 definitions builds on six core dimensions:

*“CSR implies that firms must foremost assume their core economic responsibility and voluntarily go beyond legal minimums so that they are ethical in all of their activities and that they take into account the impact of their actions on stakeholders in society, while simultaneously contributing to global sustainability.”*

Although it omits the voluntary aspect, the definition of CSR given by the European Commission provides insight on how a firm can implement CSR on a strategic level (European Commission, 2011):

*“CSR is the process whereby enterprises integrate social, environmental, ethical, and human rights concerns into their core strategy, operations, and integrated performance, in close collaboration with their stakeholders, with the aim of:*

- *Maximizing the creation of shared value for their owners/shareholders and for their other stakeholders and society at large.*
- *Identifying, preventing, and mitigating their possible adverse impacts.”*

Instinctively, one can argue that this voluntary spending of funds on CSR practices is not an optimal allocation of resources, since this money is better invested in projects that generate cashflow in the future. However, firms across the globe seem to disagree, with the Fortune Global 500 companies spending \$19,9bn on CSR activities in 2013 (UNESCO, 2015), National Stock Exchange

companies in India increasing their annual CSR expenditures by 18% in 2019 (Barbarossa, Chen, Romani, & Korschun, 2022), and S&P 500 companies increasing their CSR reporting from 20% in 2011 to 90% in 2019 (Stobierski, 2021).

So why do firms participate in CSR activities? While each firm will consider their own business model and moral standpoint, potential reasons are set out in Table 1.1.

Table 1.1: CSR Motivation (Sprinkle & Maines, 2010)

<b>Reason of CSR engagement</b>	<b>Expected benefits</b>
Altruistic intentions	Firms believe that CSR practices are part of being a good global citizen
Appearing to be a good citizen	Firms spend money on CSR practices to appease various stakeholder groups
Contracting benefits	CSR can help in the recruitment, motivation, and retainment of employees
Gaining customers	Using sustainable materials and contributing to society programs can add value to your products and result in positive publicity
Reduce production costs	Reducing packaging and transportation benefits the environment while also reducing production costs
Risk mitigation	CSR activities can be used as risk management tools. Improving employee safety reduces the chance of an incident that would otherwise result in lawsuits and bad publicity

In terms of the problem statement of this thesis, it is especially interesting how CSR affects firm risk. For listed firms, firm risk can be explained as the extent to which a firm is subjective to internal and external factors influencing stock returns. Firm risk generally consists of market (systematic) risk and idiosyncratic (unsystematic) risk. Market risks are risks that are caused by an economy wide effect, inflation for example, and cannot be avoided by a firm (Brealey, Myers, & Allen, 2020). Idiosyncratic risks are unique to a certain firm or a small group of firms, such as change in regulation for a specific industry (Ross, Westerfield, & Jordan, 2011). According to the capital asset pricing model (CAPM), investors expect a higher return when the firm risk increases. Reducing

firm risk without hurting the firm will lead to a higher asset price since it becomes more attractive to investors (Sharpe, 1964).

This thesis builds upon prior research into the effect of CSR on firm risk. According to Mishra & Modi (2013), above average scores on CSR reduces the idiosyncratic risk of a firm, while below average scores increase firm risk. Engaging in CSR activities has a positive effect on credit ratings (Jiraporn, Jiraporn, Boeprasert, & Chang, 2014), in particular when these CSR activities are socially desired and directly related to a firm's primary stakeholders (Attig, El Ghouli, & Guedhami, 2013). CSR has a positive effect on access to finance. This can be attributed to reduced agency costs owing to enhanced stakeholder engagement as well as reduced informational asymmetry thanks to increased transparency (Cheng, Ioannou, & Serafeim, 2013). Firms that adopt CSR practices can mitigate their risk exposure through effective CSR policies, as financial distress risk reduces with higher CSR scores (Boubaker, Cellier, Manita, & Saeed, 2020). Firms with more positive CSR activities in the pasts are less likely to go bankrupt when in deep financial distress and are more likely to experience accelerated recovery (Lin & Dong, 2018).

The agency theory, the stakeholder theory, and the legitimacy theory are often mentioned in literature to explain why CSR can be used to mitigate different aspects of firm risk and are further explained in Chapter 2.

## **1.2 Problem Statement**

While the effect of CSR on different firm characteristics has been an upcoming topic in literature, it is interesting to investigate how this effect of CSR on firm risk changes during global economic downturn. For example, during the 2008-2009 global economic crisis, U.S. companies with high CSR ratings outperformed firms with low CSR scores with stock returns that were at least four percentage points higher, suggesting that CSR can be thought of an insurance policy for times of crisis (Lins, Servaes, & Tamayo, 2017).

More recently, the world faced the COVID-19 health crisis, causing economic downturn and global supply chain issues. This period, also referred to as the great lockdown, resulted in a negative economic growth in June 2020 of -7.6% worldwide, -9.3% in the advanced economies and -11.8% in the European Union (OECD, 2021). As each country in the European Union has their own economy and regulations, the economic growth differed between neighboring countries. During the second quarter of 2020, a negative growth of -8,5% was measured in the Netherlands (CBS, 2020). This decline is lower than the observed declines in neighboring countries, for example Germany (-9,7%) and the UK (-19,8%), and is credited to the effective support policies and a high degree of digitalization, resulting in an above average economic recovery in the following quarters (OECD, 2021).



Over the last decades, the Dutch government's approach to CSR strategy changed from facilitating companies to a more legislative approach. Examples are the mandates for diversity in boards, mandatory reporting on CSR practices, and holding management boards accountable for CSR issues (Bustamante, Pizzutilo, Martinovic, & Olarte, 2021). For Dutch companies that are, or want to become, multinationals, following the international OECD guidelines is a prerequisite for receiving governmental support or funding for international business (RVO, 2021).

Evidence for the effect of CSR on the firm risk of Dutch listed firms is presented in the research of Boerrigter (2021), who found that CSR scores have a negative influence on both the level of total firm risk and the level of idiosyncratic risk. No literature is found concerning the change of effect size between CSR scores and firm risk in the Netherlands following the economic crisis caused by the supply chains disruption due to COVID-19 (CPB, 2021). This economic crisis is likely to have a permanent impact on the gross domestic product of Netherlands due its effect on productivity (CPB, 2020). Apart from contributing to the literature, research into the effect on CSR on firm risk during the COVID-19 crisis potentially provides valuable insights for stakeholders of Dutch firms. Therefore, the research question of this thesis is:

*What was the effect of CSR on the firm risk of Dutch listed firms during the COVID-19 crisis?*

To answer the main research question, two sub questions must be answered to provide insight into the situation prior and during COVID-19:

- 1) *What was the effect of CSR on the firm risk of Dutch listed firms during the sample period of 2018-2021?*
- 2) *Did the effect of CSR on the firm risk of Dutch listed firms change during the COVID-19 years?*

These sub questions will be answered by formulating hypotheses based on the literature review in Chapter 2. The hypotheses are checked by conducting a regression following the research method discussed in Chapter 3, where the regression formula and variables are explained. The sample used for this regression is described and analyzed in Chapter 4, while the results of the regressions are presented and analyzed in Chapter 5. Chapter 6 contains the conclusion of this research with a reflection on the results, a discussion on the research method and suggestions for further research.

## Chapter 2: Literature review

This chapter contains the theoretical background to provide insights in the effect of CSR on firm risk. For this purpose, Section 2.1 elaborates on the different theories that are provided in the literature on why CSR has an impact on firm risk. In Section 2.2, the research methods of four papers on similar research topics are compared. These theories and similar studies are used to formulate the two hypotheses in Section 2.3.

### 2.1 Existing theories

Some examples of how CSR impacts firm risk are presented in Section 1.1, the theories behind the impact of CSR on firm risk are discussed here. Section 2.1.1 covers the agency theory, Section 2.1.2 the stakeholder theory and Section 2.1.3 covers the legitimacy theory.

#### 2.1.1 Agency theory

The agency theory is a famous phenomenon that occurs when an owner (the *principal*) outsources his/her assets or decisions to another person (the *agent*) who thereby gets some decision-making authority. This relation between the principal and the agent who is approached to perform a service on the behalf of the principal is called the *agency relationship* (Jensen & Meckling, 1976). As long as the interests of the principal and agent are perfectly aligned, no problem arises. However, as authors in 1932 already suspected in the context of corporate systems, the separation of ownership from control results in a condition where the interests of owner and manager may, and often do, diverge (Berle & Means, 1932).

This divergence can be referred to as the *agency problem* and is the result of the self-interests of both parties. For example, a shareholder of a company (principal) is interested in getting the maximum return on investment. However, the manager (agent) is interested in reaching his targets, or at least keeping his job. To guarantee his bonus or his job, the manager is likely to forgo risky endeavors at the end of the year, even if these could result in a higher return on investment for the shareholder. When managers do not attempt to maximize firm value, or when shareholders incur costs to monitor the managers, agency costs are made (Brealey, Myers, & Allen, 2020).

The example above constitutes a vertical agency problem. Horizontal agency problems can occur between block holders and minority stakeholders if their interests do not align (Gogineni, Linn, & Yadav, 2022). Both vertical and horizontal agency problems can constitute to the agency costs, which consist of (Jensen & Meckling, 1976):

- Monitoring expenditures by the principal
- Bonding expenditures by the agent
- Residual loss

Monitoring expenditures includes measuring and observing the behavior of the agent, in addition to the costs of 'controlling' the agent, such as budget restrictions and compensation policies. Bonding costs are made when a manager makes efforts to reduce the agency conflict himself, either by limiting his/her own decision-making power, or by increasing the transparency of decisions made. Bonding costs are almost impossible to measure in practice (Depken, Nguyen, & Sarkar, 2006). Residual loss refers to the loss in operating performance and the incremental costs associated with agency problems' related inefficiencies, such as the costs of the divergence between the decision of the manager and the decision that maximizes the welfare of the principal (Gogineni, Linn, & Yadav, 2022).

In organizational context, the agency problem is assumed to be caused by goal conflicts and information asymmetry between principal and agent (Eisenhardt, 1989). Information asymmetry can be mitigated by an active independent board of directors, who question management and promote the disclosure of information (Kaymak & Bektas, 2017). Listed firms are required to disclose financial statements to their investors through the annual report. Disclosing information concerning CSR practices, such as expenditures related to environmental protection and employee welfare are typically not reported in financial statements despite having implications for the assessment of firm value (Dhaliwal, Zhen Li, Tsang, & Yang, 2014). By reducing the information asymmetry with transparent disclosure, investors are more likely to trade, increasing the liquidity (Verrecchia, 2001). Disclosure of CSR practices has a direct influence on the cost of equity capital, due to investor preference effects and the reduction of information asymmetry (Richardson, Welker, & Hutchinson, 1999). If the information about CSR activities is relevant to assess the prospects of the firm, enhanced disclosure of CSR has the same effect as enhanced disclosure of other financial activities (Richardson & Welker, 2001). Therefore, in line with the agency theory, increasing the quality of CSR disclosure reduces the information asymmetry and thereby the idiosyncratic risk of a firm (Dhaliwal, Zhen Li, Tsang, & Yang, 2014).

The managerial opportunism theory uses the same principal assumption as the agency theory discussed in 2.1.1, which states that managers will always be tempted to follow their own private objectives. Where the agency theory expects CSR to reduce agency costs, the managerial opportunism theory implies that there is a positive relationship between CSR activities and firm risk (Bouslah, Kryzanowski, & M'Zali, 2013). Following the managerial opportunism theory, managers can use CSR activities for their own benefit, by reducing CSR activities in financially prosperous times to 'cash in' or by engaging in CSR activities in economic downturn to justify disappointing results (Preston & O'Bannon, 1997). Additionally, managers can strategically commit themselves to CSR

projects to gain popularity from stakeholders to avoid being replaced in case of a takeover, while potentially reducing the financial potential from shareholders' investments (Cespa & Cestone, 2007).

Another reason for managers to engage in CSR activities, is the risk-averse nature of CSR. According to Godfrey (2005), engagement in CSR creates a form of goodwill for the firm that acts as 'insurance-like' protection when negative events occur. During the great recession of 2008 and 2009, managers over-invested in CSR activities, but less so in firms where board independence is stronger (Chintrakarn, Jiraporn, & Treepongkaruna, 2021). Board independence is stronger in two-tier boards and two-tier boards are the norm for Dutch listed firms (Zon, 2017). Therefore, it can be expected that managers of Dutch listed firms are less likely to over-invest in CSR activities.

### **2.1.2 Stakeholder theory**

Many management theories, including the agency theory, stem from the assumption that the goal of a company is to maximize value for shareholders. In contrast, the stakeholder theory is based on the idea that a firm should be managed in such a way that the interest of all stakeholders is considered. A stakeholder is any party that can affect or is affected by the achievement of the organization's objectives (Freeman, 1984). In addition to groups and individuals, the natural environment is also a significant stakeholder for many firms (Driscoll & Starik, 2004). The influence of a stakeholder on a firm depends on relationship structure, contractual forms, and institutional support (Friedman & Miles, 2002). Stakeholders are likely to mobilize in conditions where they feel they should express their interests or identities (Rowley & Moldoveanu, 2003). For example, if employees of a firm are threatened with reduction of their wages, they can form a union and strike to express themselves, hurting the firm in the process. However, a firm can also receive the support of their stakeholders by:

- Not being responsible for significant environmental impact (Hendry, 2006)
- Being legitimate, reliable, accountable, and strategically flexible (Choi & Shepard, 2005)
- Making stakeholders feel fairly rewarded, fairly considered, and fairly treated (Hosmer & Kiewitz, 2005)
- Board representation (Luoma & Goodstein, 1999).

Stakeholder theory and CSR are two overlapping concepts, both expecting a firm to create value for all its stakeholders. Thus, it is not surprising to expect a negative relationship between CSR and firm risk from the perspective of the stakeholder theory. For example, firms who neglect CSR practices have a higher probability of lawsuits and legal fines, whereas a high degree of CSR practices reduces firm risk through stable relations with the government and the financial community (McGuire, Sundgren, & Schneeweis, 1988). Furthermore, CSR practices increase the reputation of a

firm (Cornell & Shapiro, 1987), as well as the brand value and the image of the products of a firm (Brown & Dacin, 1997). CSR activities can also lead to a competitive advantage from an employment perspective. Engaging in CSR activities with regard to quality services, issues of diversity, and the treatment of women and the environment has a positive effect on gaining and retaining a high-quality workforce (Greening & Turban, 2000). Lastly, CSR activities that tackle social concerns (community, employment, and the environment) reduce financial risk and the likelihood of a crisis in a firm (Oikonomou, Brooks, & Pavelin, 2012). Thus, a firm that focusses on its stakeholders and shareholders, rather than solely on its shareholders is likely to reduce firm risk. In times of crisis, the created goodwill that is gained from the stakeholder relations is likely to mitigate the effects of economic downturn.

### **2.1.3 Legitimacy theory**

Where the stakeholder theory focusses on the stakeholders of the firm, legitimacy focusses on how a firm is perceived in society. A definition of legitimacy that is often given is the definition provided in (Suchman, 1995):

*“Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions.”*

Being regarded as a legitimate firm increases the willingness of organizations and individuals to provide them access to their resources (Parsons, 1960). Additionally, audiences perceive a legitimate firm to be more worthy, more meaningful, more predictable, and more trustworthy, while firms that lack acceptable legitimated accounts of their activities are more vulnerable to claims that they are negligent, irrational, or unnecessary (Meyer & Rowan, 1991).

Within the literature, there is a strategic and an institutional approach to legitimacy (Suchman, 1995). The strategic approach views legitimacy as an operational resource, where legitimacy is controlled by managers, who can extend, maintain, and defend legitimacy (Ashforth & Gibbs, 1990). The strategic approach involves an organization’s manipulation with symbolic gestures to gain public support, thereby creating legitimacy (Sonpar, Pazzaglia, & Kornijenko, 2010). An alternative to the strategic approach is the institutional approach to legitimacy, part of the institutional theory. The institutionalists view legitimacy as a set of constitutive beliefs, where a company cannot extract legitimacy from its environment, but as a phenomenon created by how a firm is built, functions, and how it is understood (Suchman, 1995). Instead of considering managers who are actively pursuing legitimacy, and the resulting agency conflict, they believe managers use the same believe systems to make decisions as other members of the community, making strategic

legitimation efforts insignificant when all demands are products of institutionalized cultural frameworks (DiMaggio & Powell, 1983).

In the dynamic real world, individual companies can gain or lose legitimacy by their actions and communications, especially by disclosing CSR activities (Podnar & Golub, 2007), but a certain general level of legitimacy cannot be manipulated easily (Panwar, Paul, Nybakk, Hansen, & Thompson, 2014). For example, the level of legitimacy for new CSR claims depends on the companies prior CSR performance, the effectiveness of its communication strategy, but also the industry the company belongs to (Du, Bhattacharya, & Sen, 2010).

The legitimacy gained by CSR practices lowers the unsystematic risk of companies by conforming to institutional expectations, better access to resources, and insulation from scrutiny (Bansal & Clelland, 2004). Disclosing CSR practices while having a bad reputation regarding CSR can lead to a skeptical reaction of the public, or even being accused of *greenwashing*. (Lindgreen, Maon, & Reast, 2012). Greenwashing is the practice where companies make claims regarding CSR to appear a good global citizen, while not making (enough) effort to actually follow up on their claims (Walker & Wan, 2012). Yet, the advantage of gaining legitimacy outweighs the disadvantages around stakeholder skepticism (Bachmann & Ingenhoff, 2016). Following this theory, companies gain legitimacy by disclosing CSR practices, which in turn results to a lower firm risk.

## **2.2 Comparing related research**

While the research topic of the effect of CSR on firm risk during COVID-19 with evidence from Dutch listed firms is not discussed in the literature as of this moment, four papers are selected that have research topics that each relate differently to the topic of this research. Table 2.2 contains an overview of these four papers to compare the different approaches used in the literature. While two papers did not specify which regression technique was used, each paper conducts multiple regressions. Most regression models follow the same structure but differ in control variables and in the fixed effects they account for. The exception is the research of Huang & Ye (2021), who conduct a tercile sorting based on the CSR scores and divide the samples in over- and underleveraged firms, creating four subsamples for the regressions. The sample size of Boerrigter (2021) stands out as a result of the smaller number of listed firms in the Netherlands compared to the U.S., while the sample size of Huang & Ye (2021) is the result of using 36-monthly rolling windows for the dependent variables. A validation method that is used in each paper is the robustness test, where substituting the CSR score with an alternative measure is used in three of the four papers. The findings are in line with the agency theory, the stakeholder theory, and the legitimacy theory.

Table 2.2: Overview research methods in similar research

Author	Jo & Na (2012)	Huang & Ye (2021)	Boerrigter (2021)	Lins, Servaes, & Tamayo (2017)
<b>Research topic</b>	The effect of CSR on firm risk in the controversial industries	The joint effect of CSR and capital structure on firm risk during COVID-19	The effect of CSR on firm risk in the Netherlands	Effect of CSR on stock returns during 2008-2009 financial crisis
<b>Research method</b>	OLS regression	Regression on subsamples	OLS regression	Regression
<b>Regression model</b>	Volatility = intercept + CSR + control variables + industry dummy + error term	Risk = intercept + COVID * excess leverage + firm year effects + industry fixed effects + error term	Risk = intercept + CSR + control variables + firm year effects + error term	Return = intercept + CSR * crisis + CSR * post-crisis + time dummy + firm fixed effects + error term
<b>Sample size</b>	2719 firm year observations from 513 US listed firms between 1991 - 2010	29011 observations from US public firms between 2016 - 2020	221 firm year observations from 53 Dutch listed firms between 2015 - 2020	1673 US listed firms between 2008 & 2009
<b>Validation methods</b>	Lagged CSR scores / 3SLS regression / robustness test with alternative measure of CSR	Robustness test: Sorting on average of environmental and social scores / sorting on community score	Robustness test: Alternative measure of CSR / alternative time interval / splitting sample	Robustness test: Alternative time interval of CSR / inclusion of microcap firms / shorter time interval
<b>Findings</b>	CSR is negatively associated with firm risk in the controversial industries	Firms with poor CSR performance that are overleveraged experienced high firm risk during COVID-19	CSR is negatively associated with the level of total firm risk and idiosyncratic firm risk	High CSR firms outperform low CSR firms during the 2008-2009 financial crisis

## 2.3 Hypothesis development

The objective of this study is to determine the effect of CSR on firm risk, and if this effect changed during the COVID-19 pandemic. Section 2.1 provides insight in the theories that can explain a negative effect between CSR and firm risk. In Section 2.3 we examine different studies than the ones discussed in Section 2.2 that found a relationship between CSR and firm risk that can be explained by aforementioned theories.

The majority of research papers that find an effect of CSR on firm risk point to the stakeholder theory to explain their findings. For example, Mishra & Modi (2013) use the stakeholder theory to explain that CSR practices can reduce firm risk by appeasing certain stakeholder groups. Reduction of firm risk can be achieved via preventing boycotts by appeasing consumers, preventing supply chain disruptions by appeasing suppliers, and through preventing strikes by appeasing workers. Attig, El Ghouli & Guedhami (2013) argue that certain CSR practices can lead to an increase in intangible assets, by creating loyalty and goodwill. From the consumer perspective, the study of Brown & Dacin (1997) highlights the effect of CSR on the response of consumers on product evaluations. Positive CSR associations with a firm result in more positive product evaluations, where negative associations have a detrimental effect on product evaluations. Job applicants are not only attracted to firms with positive CSR reputation, but they also have a higher probability of accepting a job offer from these firms (Greening & Turban, 2000). This creates a competitive advantage for gaining and retaining high quality work force. CSR practices create more value under circumstances where the practices align with the social considerations of the stakeholders, resulting in stable relationships and reducing financial firm risk (McGuire, Sundgren, & Schneeweis, 1988).

Other papers credit the agency theory for the effect of CSR on firm risk, while acknowledging the role of stakeholders. Disclosing CSR activities reduces the cost of equity capital, by reducing information asymmetry and appealing to investor preferences (Richardson, Welker, & Hutchinson, 1999). This conclusion is underlined by Dhaliwal, Zhen Li, Tsang & Yang (2014), who find that, in line with the agency theory, the negative effect of CSR disclosure on cost of equity capital is stronger in stakeholder-oriented countries, and in market with higher levels of financial opaqueness. This reduction of cost of equity capital signals a lower firm risk.

As discussed in Section 2.1.3, disclosure of CSR activities can influence the legitimacy of a firm, resulting in lower unsystematic firm risk (Bansal & Clelland, 2004). Bansal & Clelland find that firms engaging in CSR activities to meet the expectations of social actors - such as the local community or the regulatory bodies - adopt policies that reduce the likelihood of (environmental) mishaps. Furthermore, the acquired legitimacy aids firms in finding better resources compared to



illegitimate firms in case of a mishap. Following the stakeholder-, agency-, and legitimacy theories, we form the first hypothesis:

***H1. Corporate social responsibility engagement reduces firm risk.***

Papers that examine firm risk in times of crisis and acknowledge the aforementioned theories provide evidence that engagement in CSR moderated firm risk in the past and present. As discussed in Section 2.2, Lins, Servaes & Tamayo (2017) provide evidence that CSR activities lead to firm-specific social capital. This social capital paid off during the 2008-2009 financial crisis, when the importance of trust increased unexpectedly. They conclude that firm-specific social capital can be seen as an insurance policy for times when investors and the overall economy face a severe crisis of confidence. The paper of Bouslah, Kryzanowski & M'Zali (2013) discusses the effect of social performance, a similar variable to CSR, on idiosyncratic risk of non-financial U.S. firms during the financial crisis of 2008-2009. This paper finds that an increase of one standard deviation in social performance decreases the firm's idiosyncratic risk by about 0.58 - 2.43 %. Huang & Ye (2021), discussed in Section 2.2, find that CSR has a negative effect on both stock volatility and bankruptcy risk for overleveraged firms during the COVID-19 crisis. These finds lead to the following hypothesis:

***H2. The effect of corporate social responsibility on firm risk increased during COVID-19.***

## Chapter 3: Data and methodology

This chapter elaborates on the methodology of this research. Section 3.1 covers the gathering of. The research method and model are discussed in Section 3.2. Section 3.3 contains the measurements of the dependent, independent, and control variables. Robustness tests are covered in Section 3.4.

### 3.1 Data gathering

The aim of this research is to find and measure different effects on firm risk in the Netherlands. Therefore, Dutch firms that are listed on the Amsterdam Exchange (AEX), the Amsterdam Midcap Index (AMX), and the Amsterdam Small Cap Index (AScX)<sup>1</sup> form the sample of this research. Companies that are listed on the Dutch stock exchanges are obliged to disclose financial reports, whereas private companies do not have this obligation. The selection of the final sample is discussed in Section 4.1. Both the CSR scores and the financial data used in the variables for this research are gained through the Thomson Reuters Refinitiv Eikon database<sup>2</sup>. Daily stock prices are gathered from the yahoo finance database<sup>3</sup>, since the adjusted closing prices are not available through the Thomson Reuters Refinitiv Eikon database for Dutch listed firms. In line with the study of Huang & Ye (2021), the main results cover the period from January 2018 to December 2021. January 2018 is two years prior to COVID, and by ending the sample before 2022, the contamination of market volatility caused by the Russian invasion in Ukraine is avoided.

### 3.2 Methodology

#### 3.2.1 Research method

Following the example of related research papers, as presented in Section 2.2, the hypotheses are tested in a regression model. Firm risk is not only influenced by CSR, so additional variables are required to explain firm risk in our model. These variables are set out in Section 3.3. The relationship between the independent variable(s) and the dependent variable is displayed by a regression line. Since the observations are likely to be scattered instead of forming a perfect line, the regression line has to be estimated. A frequently used estimator in financial studies is the ordinary least squares (OLS) regression, the more an observation deviates from the expected value, the higher the squared error. The OLS regression finds a regression line of best fit, by minimizing the squared errors (Cooper & Schindler, 2011).

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<sup>1</sup> Euronext Amsterdam (2023). Retrieved from <https://live.euronext.com/nl/markets/amsterdam/equities/list>

<sup>2</sup> Thomson Reuters Refinitiv Eikon database (2023). Retrieved from <https://eikon.refinitiv.com/>

<sup>3</sup> Yahoo finance (2023). Retrieved from <https://finance.yahoo.com>

In the search for the effect of the independent variables on the dependent variable, it is important to include other variables that influence the dependent variable in the model. To avoid violating the assumption of the independence of the error term we include control variables in the research model. Additionally, to use OLS regression we have to avoid endogeneity, a correlation between the explanatory variables and the error term. To overcome this obstacle, the independent and control variables are lagged by one year and are used as an instrumental variable for a two-staged least squares regression, following Jo & Harjoto (2012).

### 3.2.2 Research model

The results are based on the following regression model:

$$Risk_{it} = \beta_0 + \beta_1 * CSR_{it-1} + \beta_2 * COVID + \beta_3 * CSR_{it-1} * COVID + \beta_4 * Size_{it-1} + \beta_5 * ROA_{it-1} + \beta_6 * Leverage_{it-1} + \beta_7 * MTB_{it-1} + \beta_8 * Industry + \varepsilon_{it}$$

Where:

$Risk_{it}$	= Total risk of firm i in year t
$CSR_{it-1}$	= CSR score of firm i in year t -1
$COVID$	= Dummy variable that equals 1 from January 2020 to December 2021, otherwise it equals 0
$Industry$	= Dummy variable that equals 0 for non-sensitive firms, otherwise it equals 1
$(Size/ROA/Leverage/MTB)_{it-1}$	= Size/ROA/Leverage/MTB value of firm i in year t-1
$\varepsilon_{it}$	= Firm-specific errors

### 3.3 Measures

This section covers the elaboration upon the dependent and independent variables, concluded by an overview of the variables and measures in Table 3.3.

#### 3.3.1 Dependent variables

The dependent variable in this research is firm risk. As explained in Section 1.1, a firms' total risk consists of idiosyncratic risk and systematic risk. Each regression uses either total firm risk, systematic firm risk, or idiosyncratic firm risk as the dependent variable in the model.

Following similar studies (Jo & Na, 2012) (Huang & Ye, 2021) , the total risk of a firm is measured by using the standard deviation of daily stock returns. Daily stock returns are retrieved

from the yahoo finance database using the adjusted closing prices. For our regression, the standard deviations of the daily stock returns can be annualized by multiplying the standard deviation of the daily returns by the square root of the number of trading days that year.

Next, we approximate systematic risk using the capital asset pricing model (Sharpe, 1964) in the regression:  $R_a = \alpha + R_{rf} + \beta(R_m - R_{rf}) + \varepsilon$ . To find the systematic risk, represented by  $\beta$ , we gather the daily stock returns and the risk-free rate. Daily stock returns are gathered from the yahoo finance database. By gathering daily returns from the Amsterdam All-Share index - the weighted index based on the prices of shares of all eligible companies listed on Euronext Amsterdam - we get  $R_m$ . For the risk-free rate, we use the daily yield on a 10-year bond from the Netherlands. Weekly rates with the yearly yield are gathered from the trading economics website<sup>4</sup>, and are interpolated to daily rates with daily yields.

The idiosyncratic risk for a firm can be approximated as the standard deviation of residuals from the CAPM formula with the daily returns, following Huang & Ye (2021). To annualize this value, we multiply it by the square root of the number of trading days of the corresponding year.

### **3.3.2 Independent variables**

#### ***Corporate social responsibility***

For this research we focus on the impact of CSR on firm risk. Following other research, we use ESG scores from the Refinitiv Eikon Database to quantify CSR practices. Annual reports, NGO and company websites, CSR reports, as well as news sources are analyzed by an independent audit team and standardized into environmental, social, and governance scores (Refinitiv, 2022). The environmental (20,3%), social (53,2%), and Governance (26,5%) scores result in an ESG score (100%) for each firm, which is scaled from 0 to 100.

### **3.3.3 Control variables**

#### ***Firm size***

Firm size has a significant negative effect on stock returns (Banz, 1981) and is considered to be a prominent empirical contradiction to the capital asset pricing model (Fama & French, The cross-section of expected stock returns, 1992). Theories on the negative relation between firm size and stock returns point to information risk, financial distress risk and liquidity as relevant factors. Small companies generally have a lower quality of information disclosure which increases the risk for investors, resulting in higher stock returns as compensation (Banz, 1981). While the CAPM framework does not take financial distress costs into account, investors expect a compensation for small firms as these have a greater risk of financial distress (Chan & Chen, 1991). Market

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<sup>4</sup> <https://tradingeconomics.com/netherlands/government-bond-yield>

imperfections are more likely to result in liquidity difficulties for small stocks than large stocks, resulting in the size premium (Acharya & Pedersen, 2005).

There is a positive relationship between firm size and CSR disclosure (Cowen, Ferreri, & Parker, 1987) (Meek, Roberts, & Gray, 1995). Larger firms are more visible to the public and therefore are the subject of greater pressures from external stakeholders. In line with the stakeholder theory, larger firms tend to disclose more information of their CSR practices to reduce potential conflicts with stakeholders, reducing firm risk (Meek, Roberts, & Gray, 1995). Firm size is measured by the natural logarithm of the total assets, following previous research (Huang & Ye, 2021).

### ***Profitability***

Firms with a higher return on assets (ROA) are more likely to be associated with lower risk (Jo & Na, 2012). ROA indicates a company's profitability in relation to its total assets. This efficiency is considered an important driver of free cash flow and firm value (Miller, Mathisen, & McAllister, 2004). Additionally, profitability is strongly related to average stock return (Fama & French, 2015).

There is no statistically significant evidence found that supports the claim that CSR practices lead to a higher profitability (Aupperle, Carroll, & Hatfield, 1985), while profitability has a positive effect on CSR disclosure (Swandari & Sadikin, 2016). This is not surprising, since more profitable firms are more likely to have the funds to implement CSR programs. We use the return on assets (ROA) as a proxy for firm profitability. To calculate the return on assets we divide the net income after tax of a firm by the total assets of a firm.

### ***Leverage***

To raise funds, a firm can either get a loan (debt financing) or issue stock (equity financing). The debt/equity ratio is also referred to as the capital structure of a company. According to the trade-off theory (Kraus & Litzenberger, 1973), there is an optimal debt/equity ratio that maximizes firm value. Overleverage occurs when debt financing is overused, leading to financial distress risk. Underleveraged firms have more debt capacity, which increases the liquidity and provides safety in times of crisis (Machica & Mura, 2010). The spare cash holdings resulting from being underleveraged can lead to agency problems, but this risk is mitigated in times of economic recession (Kesten, 2010). There is a positive relationship between leverage and firm risk, especially in times of economic downturn (Huang & Ye, 2021).

CSR practices can be used to reduce the increased risk of overleveraged firms (Bae, Ghoul, Guedhami, Kwok, & Zheng, 2019). During the COVID-19 pandemic, overleveraged firms without CSR practices experienced higher stock volatility and higher financial distress risk compared to overleveraged firms with CSR practices, while underleveraged firms did not experience significant

risk increases, regardless of CSR policy (Huang & Ye, 2021). Leverage is measured by the total debt divided by the total asset of a firm.

### ***Market to book ratio***

The market to book ratio compares the market value of a firm with the accounting value (book value), and signals if a stock is undervalued or overvalued. The market to book ratio, as the name suggests, is calculated by the market capitalization divided by the total book value of a firm. The total book value is calculated by subtracting total current liabilities from the tangible assets of a firm, while market capitalization is gathered from the financial summary in the Thomson Reuters Refinitiv Eikon database. Firms with low market to book ratio have higher expected stock returns, potentially resulting from poor prospects perceived by investors (Fama & French, 1992).

### ***Industry***

We include the variable '*Industry*', since the type of industry a firm operates in affects the level of firm risk (Oviatt & Bauerschmidt, 1991). According to Oviatt & Bauerschmidt (1991) there are four industry factors that influence firm risk:

- **Industry growth** - an increase in sales growth of an industry can signal healthy environmental conditions and profitable opportunities, yet it also invites new competitors to the market with reduction of profit margins as a result.
- **Barriers to entry** - barriers to entry for new competitors - such as economics of scale, high capital requirements, switching costs, and government policy - lead to a reduction of variance in returns. Firms in industries with high barriers to entry for new firms have less firm risk than firms active in an industry with low barriers to entry.
- **Seller concentration** - industries where a few firms have a relatively high market share (oligopoly) are more concentrated than industries where many firms all have a small market share. This concentration can lead to higher efficiency, but is positively related to firm risk, due to the risks of an oligopolistic rivalry. In an oligopolistic market, a shift in the status quo is more likely to result in a rivalry that reduces returns until a new status quo is found.
- **Number of competitors** - an increase in competitors is likely to result in lower profit margins and more firm risk due to a weaker position of the firm. There is a theoretical point where an industry is saturated; there is very low profit margin but enough to sustain the firm. In this situation, the firm risk is also low.

CSR disclosures of a firm are influenced by industry type. Firms operating in controversial industries that are not in line with social norms or involved with emerging environmental, social, and ethical issues can reduce firm risk by engaging in, and disclosing of, CSR activities (Jo & Na, 2012).

These firms are considered sensitive firms. In line with the stakeholder theory, CSR disclosures provide market appeal to customers, improve transparency, and increase access to financial markets. Firms are categorized into different industries using the standard industrial classification (SIC) codes, for example construction, agriculture, or wholesale trade. Firms are considered sensitive if they operate in the alcohol-, tobacco-, gambling-, military-, firearms-, nuclear energy-, cement-, oil-, or biotech industries (Jo & Na, 2012). In addition, firms operating in the financial industry are often excluded from samples in research due to their high leverage (Fama & Fench, 1992).

Table 3.3: Description and measures of the variables

Variable name	Description and measurement
<b>Panel A: Dependent variables</b>	
Total firm risk	The total risk of firm $i$ in year $t$ , measured by the standard deviation of daily stock returns.
Systematic risk (Beta)	The systematic risk of firm $i$ in year $t$ , estimated from CAPM model
Idiosyncratic risk	The idiosyncratic risk of firm $i$ in year $t$ , measured by the annualized standard deviation of the residuals of the regression of the CAPM model
<b>Panel B: Independent variables</b>	
CSR	CSR score of firm $i$ in year $t$ , obtained through Thomson Reuters Refinitiv Eikon database
COVID	Dummy variable that equals 1 from January 2020 to December 2021, and zero otherwise
Leverage	The book value of total debt divided by the book value of total assets of firm $i$ in year $t$
Size	The natural logarithm of total assets of firm $i$ in year $t$
ROA	Return on assets of firm $i$ in year $t$ , calculated by dividing net income by total assets
Market to Book	Market capitalization divided by the total book value of firm $i$ in year $t$
Industry	Dummy variable that equals zero for non-sensitive firms, and equals 1 otherwise

### 3.4 Robustness tests

In order to test if the results of this research change under different circumstances, we conduct two robustness tests. For the first robustness test, we divide the sample into two subsamples and run the regression for each. In the first subsample we include firms from the sensitive and financial industries. The remaining firms are used for the second subsample. While the variable industry type is used in the model, using the subsamples provides insight into the question if the effect of CSR on firm risk for non-sensitive firms is different than the effect of CSR on firm risk of sensitive firms. Following the literature, we expect a stronger effect of CSR on the firm risk of sensitive firms (Jo & Na, 2012).

For the second robustness test, we use CSR disclosure scores rather than the CSR scores used by the Thomson Reuters Refinitiv Eikon database. The latter considers more than 70 key performance indicators to rate a firm on environmental, social and governance pillars (Refinitiv, 2022). The CSR *disclosure* scores on the other hand, measure how transparent, open, and insightful firms are concerning CSR practices in their business process and value chain. The CSR disclosure scores are gathered from the transparency benchmark, an initiative from the Dutch government (Netherlands Enterprise Agency, 2022). Every odd-numbered year, the 500 largest Dutch companies receive an invitation to conduct a self-assessment, which is reviewed by a third party. Firms achieve scores on different criteria, such as organization, communication, and strategy. This results in a total score between 0-100, with 100 being the highest score. Since this benchmark is biannual and the scores are based on the previous financial year, we use the scores from the reports of years 2019<sup>5</sup> (pre-COVID) and 2021<sup>6</sup> (COVID). Thus, by using the reports from 2019 and 2021, we gather the CSR disclosure scores of 2018 and 2020 and use the data for years 2019 and 2021 for the dependent variables to compare the results from this robustness test with the results of the regression of this research. This way both models use a lagged variable for CSR or CSR disclosure score.

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[https://www.transparantiebenchmark.nl/sites/transparantiebenchmark.nl/files/afbeeldingen/rapport\\_transparantiebenchmark\\_de\\_kristal\\_2019\\_nl\\_wcag\\_versie\\_volgt\\_later.pdf](https://www.transparantiebenchmark.nl/sites/transparantiebenchmark.nl/files/afbeeldingen/rapport_transparantiebenchmark_de_kristal_2019_nl_wcag_versie_volgt_later.pdf)

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[https://www.transparantiebenchmark.nl/sites/transparantiebenchmark.nl/files/afbeeldingen/juryrapport\\_transparantiebenchmark\\_2021.pdf](https://www.transparantiebenchmark.nl/sites/transparantiebenchmark.nl/files/afbeeldingen/juryrapport_transparantiebenchmark_2021.pdf)



## Chapter 4: Sample analytics

This chapter provides insight in the data that is used in the regression. Section 4.1 contains the selection process of the firms in our sample. The data pertaining to the firms are analyzed in Section 4.2. Section 4.3 contains the Pearson correlation matrix, providing insight into the correlation between the variables described in in Section 3.3.

### 4.1 Sample

The sample for this research consists of publicly traded firms active in the Netherlands. Listed companies are obliged to disclose financial reports, a requirement that does not apply to private firms. The Euronext Amsterdam is the Dutch exchange where, on time of writing, 155 firms trade common stock. Firms traded on the Euronext Amsterdam are generally listed on the Amsterdam Exchange (AEX), the Amsterdam Midcap Index (AMX), or the Amsterdam Small Cap Index (AScX). Not all firms that are traded on the Euronext Amsterdam are active in the Netherlands: this excludes 50 firms from the potential sample. From the 105 remaining firms, 7 firms were not publicly traded prior to COVID-19 and are similarly excluded. Another 52 firms are excluded for not having CSR scores available for the years 2017-2020, a prerequisite for the regression of years 2018-2021 since CSR is a lagging variable. This reduction results in 46 firms that are active in the Netherlands and have CSR scores available. Lastly, one firm is excluded for having an adjusted closing price of 0 during most of the sample period.

Therefore, the sample of this research consists of 45 firms. 15 firms from the final sample lack at least one datapoint but are included to increase the number of firm year observations. For example, a firm which did not receive a CSR score in 2017 is still included for the other years. This sample of 45 firms, which are listed in Appendix A, in combination with the time period between January 2018 and December 2021 results in 165 firm-year observations. This is not only just a fraction of the dataset (29011 observations) of Huang & Ye (2021), but it is also smaller than the dataset (211 observations) of Boerrigter (2021), who conducted a similar research in the Netherlands. Increasing the sample size increases the generalizability of the model, as individual scores do not influence the results as much as they do in a smaller sample size. A smaller sample size increases the chance of a Type II error, where we cannot reject  $H_0$  although it is false (Forstmeier, Wagenmakers, & Parker, 2017). Section 4.2 discusses the methods that are used to reduce the influence of outliers.

Table 4.1: Summary sample selection

Requirements	Number of firms excluded	Sample size
Traded on the Euronext Amsterdam	-	155
Dutch firms	50	105
IPO prior to 2019	7	98
CSR data prior to 2019	52	46
Able to be used in the regression	1	<b>45 (final sample)</b>

## 4.2 Descriptives statistics

The descriptive statistics of the data used in this research are presented in Table 4.2. The descriptive statistics provide insight into the data points. When using data for OLS regression, influential observations that are relatively far away from the rest of the data can distort the estimates of the regression coefficients. An outlier can be removed from the dataset if it is an observation error or if it is caused by an extraordinary situation that is not relevant to the scope of the study (Montgomery & Runger, 2011). For the purposes of this study, it is relevant to include outliers if they are directly or indirectly caused by COVID-19. To minimize the influence from extreme outliers, the independent variables are winsorized at 2.5% and 97.5% following similar research (Huang & Ye, 2021). For this research, data from four financial years is gathered of each of the 45 firms in the sample. If a firm is missing a value for a variable in a year, the data of that firm for that particular year is removed from the sample, resulting in 165 firm-year observations. The descriptive statistics are in line with descriptive statistics of a study concerning firm risk in the Netherlands (Boerrigter, 2021).

Table 4.2: Descriptive statistics

<b>Variables</b>	<b>N</b>	<b>Mean</b>	<b>Std.dev</b>	<b>Min</b>	<b>Median</b>	<b>Max</b>
Total firm risk	165	<b>0.338</b>	0.136	0.137	0.309	0.868
Systematic firm risk	165	<b>0.956</b>	0.445	<b>-0.334</b>	0.895	2.020
Idiosyncratic firm risk	165	<b>0.286</b>	0.110	0.126	0.268	0.683
CSR Score	165	<b>0.580</b>	<b>0.154</b>	<b>0.219</b>	0.611	0.827
CSR-Trans	90	<b>0.500</b>	<b>0.218</b>	<b>0.090</b>	0.515	0.895
Leverage	165	0.270	0.172	0.01	0.250	0.69
Size	165	8.731	2.060	5.256	8.421	13.649
Market to book	165	3.409	4.727	0.341	1.833	<b>22.724</b>
ROA	165	0.036	0.055	-0.105	0.038	0.176

The outliers of the data regarding total firm risk correspond to the outliers of the data regarding idiosyncratic firm risk. This is expected since total firm risk consists of systematic and idiosyncratic firm risk. The outliers and their cause are:

1. FUGRO 2020

-Total risk: 0.86877

-Idiosyncratic risk: 0.68343

Cause: Project cancellation due to COVID-19 and loss of revenue due to decline in oil price (Offshore Engineer, 2020), again caused by COVID-19 (Bourghelle, Jawadi, & Rozin, 2021)

2. BASIC FIT 2020

-Total risk: 0.74406

-Idiosyncratic risk: 0.61992

Cause: Basic fit, a chain of gyms, suffered from the lockdown caused by COVID-19 (Clercq, 2021).

### 3. WERELDHAVE 2020

-Total risk: 0.73667

-Idiosyncratic risk: 0.64379

Cause: Wereldhave specializes in retail property and suffered from the lockdown of stores during COVID-19 (Zeven, 2020).

The mean value of the variable systematic firm risk is 0.956, which means that the firms in the sample are slightly less volatile compared to the overall market. Firms with high systematic risk in the sample are firms that produce semiconductors or raw materials for other firms. It stands to reason that firms who are dependent on the market have an amplified systematic risk. A negative beta indicates an inverse relation to the market, where a firm does better when the market declines. Firms with a negative systematic risk are included in the sample of a similar study (Huang & Ye, 2021). The firm with negative systematic risk in the sample of this research is a proprietary trading firm that is using high frequency trading strategies. This firm, Flow Traders, receives a cut of each trade made on their platform, and thus profited from the uncertainty on the stock market during COVID-19 (Molenaar, 2020).

The values on the CSR scores (mean = 0.580) are in line with a similar study on Dutch public firms (mean = 0.610) (Boerrigter, 2021), but higher than CSR values in a similar study conducted with a sample on US public firms (mean = 0.383) (Huang & Ye, 2021). The difference between CSR scores of Dutch public firms and US public firms is the topic of a study done by LaGore, Mahoney and Thorne (2020), who found that these increased CSR scores can be explained by cultural and regulatory differences. The Netherlands has less enforcement, higher stakeholder orientation, less individualistic culture, mandatory CSR disclosures and a civil law legal system compared to the United States.

The values on the control variables leverage, size, and ROA are in line with similar studies (Boerrigter, 2021) (Jo & Na, 2012) (Huang & Ye, 2021). The distribution of data points for the variable market to book is right-skewed. This is caused by relatively young firms with a high growth rate, such as fintech firm Adyen (22.724).

Distributions of all variables that are discussed in the descriptive statistics are presented in Appendix B. The difference in distributions of the CSR scores (Table B.8) and the CSR disclosure scores (Table B.9), the difference in the mean values of *CSR* (0.580) and *CSR-Trans* (0.500), the difference in standard deviation between *CSR* (0.154) and *CSR-Trans* (0.219), and the difference in the minimum scores of *CSR* (0.219) and *CSR-Trans* (0.090) signal that these two variables differ substantially from each other, as discussed in Section 3.4.

### 4.3 Pearson's correlation matrix

To understand if and how variables correlate, the Pearson's correlation matrix is used. Continuous variables, dependent or independent, that are measured on an interval or ratio scale can be analyzed by using the Pearson's correlation matrix (Cooper & Schindler, 2011). Each correlation coefficient has a value in the range between -1 and 1. The value represents the magnitude and direction of the relationships and is tested for significance on the 0.05 and 0.01 level. A significant negative value indicates a negative relationship between the variables, whereas a significant positive value indicates a positive relationship. The magnitude is indicated by the value itself; a value close to zero is a very weak relationship, while a value close to 1 is a very strong relationship.

The Pearson's correlation matrix with the variables used in this research is presented in Table 4.3. Each variable has at least one significant relationship with another variable. As expected, the relationships between *Total firm risk* and *Systematic firm risk* and between *Total firm risk* and *Idiosyncratic firm risk*, are significantly positive. In line with similar research (Boerrigter, 2021), there is a significant positive relationship between *Systematic firm risk* and *Idiosyncratic firm risk*. Based on the concepts of *systematic firm risk* and *idiosyncratic firm risk*, this relationship should not be significant. This relationship between these variables exists as a result of the CAPM regression, explained in Section 3.3.1, which is used to calculate both variables.

In line with Section 3.3.3, the control variables *Leverage* (+.153\*), *Size* (-.363\*\*), and *ROA* (-.222\*\*) have a significant relationship with the variable *Idiosyncratic firm risk*, all with their expected direction. The relationship between the variables *MTB* and *Idiosyncratic firm risk* is not significant.

Table 4.3: Pearson's correlation matrix

Variable	Number	1	2	3	4	5	6	7	8	9
TOTfirmRisk	1	1								
SystfirmRisk	2	.484**	1							
IdiofirmRisk	3	.946**	.305**	1						
CSR	4	-.260**	-.004	-.346**	1					
CSR-Trans	5	-.438**	-.172*	-.359**	.226**	1				
Leverage	6	.074	-.175*	.153*	-.120	.025	1			
Size	7	-.239**	.008	-.363**	.431**	.113	-.161*	1		
MTB	8	.123	.068	.150	-.272**	-.182*	-.206**	-.325**	1	
ROA	9	-.157*	.058	-.222**	.184*	-.034	-.096	-.108	.205**	1

\* and \*\* correspond to the 0.05 and 0.01 level respectively (2-tailed)

In line with hypothesis 1, there is a significant negative relationship between the variables *CSR* and *Total firm risk*, and between *CSR* and *Idiosyncratic firm risk*. There is not a significant relationship between the variables *Systematic firm risk* and *CSR*. In line with previous research (Cowen, Ferreri, & Parker, 1987) (Meek, Roberts, & Gray, 1995), there is a significant positive relationship between the variables *Size* and *CSR*. The significant positive relationship between profitability (*ROA*) and *CSR* is in line with the research of Swandari & Sadikin (2016).

## Chapter 5: Results

This chapter covers the results of the regression analysis. The assumptions of the regression analysis are assessed in Section 5.1. Section 5.2 contains the results of the regressions of the hypotheses. The robustness tests are examined in Section 5.3.

### 5.1 Assumptions

Prior to analyzing the results of the regressions, certain assumptions must be satisfied to ensure the results are reliable and valid.

Apart from the specific assumptions regarding OLS-regressions, there are assumptions to reduce type I and type II errors. The probability of type I errors, where we reject the null hypothesis  $H_0$  when it is true, is expressed in the significance level. The significance level is denoted by either one, two or three asterisks (\*), corresponding to  $\alpha = 0.10, 0.05$  and  $0.01$  respectively. An Alpha of  $0.10$  means that the type I is expected to occur 10 out of 100 tests. The probability of type II errors, where we fail to reject the null hypothesis when it is false, is expressed in the power. A power value of  $0.80$  means that there is a 20% change of a type II error. To reduce type II errors for a chosen significance level the sample size can be increased (Montgomery & Runger, 2011). For each additional independent variable in a multiple regression the sample size must increase since it reduces the degrees of freedom. A multiple regression with 7 independent variables, a power level of  $0.80$ , and an Alpha of  $0.01$  requires a sample of at least 141 observations in order to find medium and large effect sizes (Cohen, 1992). With the sample size of 165 observations, the regressions can be expected to find effects with a magnitude around and above  $.30$ , positive and negative. In the Pearson's correlation matrix of Table 4.3, relationships with magnitudes as low as  $.153$  are significant.

In order to make use of regressions, assumptions regarding the model and variables need to be satisfied. The normality of the error term is an assumption used for statistical tests such as ANOVA and OLS regression. Violation of this assumption affects the p-values of the test, and thus increases the chance of type II errors. Following the central limit theorem, since we have a sufficiently large sample ( $n > 30$ ) we can neglect this assumption, as the sum of the error terms follows a normal distribution (Cooper & Schindler, 2011).

The linearity assumption is satisfied if there is a linear relationship between the dependent and independent variables. To test this assumption, P-P plots are used to assess the fit of the regression standardized residuals. Appendix C contains the P-P plots for the different firm risks as dependent variables. While the plots indicate a skewness in the sample, linearity can be assumed since the line can be derived from the position of the data points.

Violation of the assumption of constant variance results in unreliable estimates for the model coefficients. To assess this assumption, a scatterplot that plots the regression standardized residuals against the regression standardized predicted value is plotted. The constant variance assumption is met when there is not a particular pattern, and residuals are randomly scattered. The scatterplots are displayed in Appendix D, where the scatterplots of the systematic firm risk and idiosyncratic firm risk indicate randomly scattered residuals. The scatterplot of the residuals of the total firm risk, however, has a small spread around point (-2, 0), which could indicate a violation of the assumption of constant variance. Non-constant variance results in inaccurate p-values, although regression coefficient estimates will still be unbiased (Hayes & Cai, 2007).

The assumption concerning the independence of the error term can be satisfied with the use of control variables as discussed in Section 3.2.1. The endogeneity problem is circumvented by lagging the independent and control variables by one year. The endogeneity problem occurs when there is a correlation between the explanatory variables and the error term. Finally, multicollinearity can occur between independent variables, reducing the statistical significance of an independent variable. The assumption regarding multicollinearity is not violated for the independent variables. The Pearson's correlation matrix shows that the strongest relationship between variables is the .431 correlation between *CSR* and *size*, which is not considered to be a strong correlation (Hair, Black, Babin, & Anderson, 2014).

## 5.2 Regression results

### 5.2.1 Regression result hypothesis 1

Hypothesis 1 holds if engagement in CSR reduces firm risk. For each type of firm risk, a regression is conducted, and the results are presented in Table 5.2.1. *Leverage*, *size*, *MTB*, *ROA*, *CSR*, *COVID*, and *SIT* are used as independent variables in the models for this hypothesis. The models explain 24.0%, 9.6%, and 30.8% of the variances of *Total firm risk*, *Systematic firm risk*, and *Idiosyncratic firm risk* respectively.

For our sample there are significant negative relationships between *CSR* and both *Total firm risk* (-0.209\*\*\*) and *Idiosyncratic firm risk* (-0.160\*\*\*). When a firm increases their CSR score by the standard deviation (0.154), it can thus be expected that the total firm risk will decrease by 3,22% (0.209 \* 0.154). The idiosyncratic firm risk is expected to be reduced by 2,46% (0.160 \* 0.154).

This negative effect of CSR on total and idiosyncratic firm risk is in line with the stakeholder theory, the agency theory, and the legitimacy theory. This study does not find a significant relationship between CSR and systematic firm risk. The lack of a significant relationship between CSR and systematic firm risk can be rationalized by observing that engagement in CSR activities lead to immediate costs for the firm, while the expected benefits are mid- to long-term (Oikonomou,



Brooks, & Pavelin, 2012). A lack of significant relationships can be caused by omitted variables, which is discussed in Section 6.2, and is signaled by the poor model fit for systematic firm risk (an adjusted  $R^2$  of 0.096. This is in line with the study of Boerrigter (2021), where significant negative relationships were found between CSR and both total firm risk and idiosyncratic firm risk, but not between CSR and systematic firm risk.

The independent variable *Leverage* does not have a significant negative effect on *Total firm risk* or *Idiosyncratic firm risk* in this model. Contrary to the literature, leverage has a significant negative effect on systematic firm risk (-0.460\*\*). While this effect is also found by Boerrigter (2021) for firms in the Netherlands, leverage ought to be positively correlated with systematic firm risk (Huang & Ye, 2021), due to lower profits caused by interest rates. A negative correlation between leverage and systematic firm risk can be caused by the negative yield on a 10-year bond, which is used as a proxy for interest rate or the inclusion of firms from the financial sector where high leverage is the norm (Fama & French, 1992). Excluding the financial firms from the sample, as done in Appendix E, shows that the relationship is not significant ( $p=0.149$ ). However, this can also be caused by the reduction of the sample size from 165 to 135 following the exclusion of financial firms.

The independent variable *Size* has a positive relationship with *Systematic firm risk* (0.037\*) and a negative relationship with *Idiosyncratic firm risk* (-0.011\*\*). The significant negative relationship between *Size* and *Idiosyncratic firm risk* is in line with literature (Banz, 1981). The significant positive relationship (0.037\*) between *Size* and *Systematic firm risk* is not in line with similar research for U.S. listed companies, where a significant negative relationship was found (-0.090\*\*) (Huang & Ye, 2021). Apart from potential omitted variables or a Type II error, this difference in relationship could be explained if the effect of *Size* on *Systematic firm risk* depends on the firm size. The difference in mean value for *Size* between U.S. listed firms (7.736) and Dutch listed firms (8.731) is substantial since *Size* is measured as the natural logarithm of total assets. No research is found that focusses on the question if the impact of size on systematic firm risk is dependent on the size of a firm. The sample size of this research limits the possibility to assess this theory for our dataset.

There is no significant relationship between *MTB* and *Total firm risk*, *Systematic firm risk*, and *Idiosyncratic firm risk*. This lack of a significant relationship is in line with the findings of Boerrigter (2021).

The independent variable *ROA* has a significant negative relationship with *idiosyncratic firm risk* (-0.327\*\*). As described in Section 3.3.3, the literature suggest that profitability has a negative relationship with firm risk (Fama & French, 2015), this relationship is found in research of Boerrigter (2021), Huang & Ye (2021), and Jo & Na (2012) for all types of firm risk.

The effect of the COVID years on the variances of the three types of firm risk is significant. Total and idiosyncratic firm risk increased significantly (0.108\*\*\* and 0.073\*\*\*, respectively) during the COVID years, while systematic firm risk decreased (-0.129\*). This is in line with the study of Huang & Ye (2021), who found a positive significant relationship between COVID and total (0.007\*\*\*) and idiosyncratic risk (0.001\*\*\*), and a negative significant relationship between COVID and systematic risk (-0.478\*\*\*).

Based on the regression, firms that are considered to be sensitive are expected to have a lower variability of *Total firm risk* (-0.041\*) and lower *Systematic firm risk* (-0.303\*\*\*). The negative significant effect of being a sensitive firm on systematic risk can be caused by a multicollinearity issue since financial firms are considered sensitive in our model, which are known for having much higher leverage (Fama & Fench, 1992), which has a significant negative effect on *Systematic firm risk* (-0.460\*\*) in our model. The significant effect on *Total firm risk* is not in line with literature, where stocks from controversial firms have higher risk and returns (Hong & Kacperczyk, 2009).

Table 5.2.1: Regression outcomes H1

Variables	TotfirmRisk	SystfirmRisk	IdiofirmRisk
CSR	<b>-0.209***</b> (-2.857)	-0.177 (-0.678)	<b>-0.160***</b> (-2.841)
MTB	0.001 (0.614)	0.005 (0.576)	0.001 (0.829)
ROA	-0.164 (-0.878)	0.698 (1.046)	<b>-0.327**</b> (-2.274)
Size	-0.003 (-0.490)	<b>0.037*</b> (1.686)	<b>-0.011**</b> (-2.333)
Leverage	-0.011 (-0.184)	<b>-0.460**</b> (-2.246)	0.034 (0.759)
COVID	<b>0.108***</b> (5.695)	<b>-0.129*</b> (-1.902)	<b>0.073***</b> (4.976)
SIT	<b>-0.041*</b> (-1.793)	<b>-0.303***</b> (-3.717)	-0.016 (-0.921)
Constant	0.445*** (7.294)	0.995*** (4.570)	0.438*** (9.335)
Observations	165	165	165
Adjusted R <sup>2</sup>	0.240	<b>0.096</b>	0.308

\*, \*\* and \*\*\* correspond to the 0.1, 0.05 and 0.01 level respectively (2-tailed)

Overall, the findings in Table 5.2.1 support H1 that engagement in CSR significantly reduces total firm risk and idiosyncratic firm risk. For systematic firm risk, the null hypothesis that there is no significant effect between CSR and systematic firm risk cannot be rejected.

### 5.2.2. Regression results hypothesis 2

Hypothesis 2 holds if the effect of CSR on firm risk increased during COVID-19. This effect that is found under specific circumstances in previous research (Lins, Servaes, & Tamayo, 2017) (Huang & Ye, 2021), is measured by the interaction variable *CSR\*COVID*. The results of the regression of this model are presented in Table 5.2.2.

The magnitude of the independent variables changed in comparison to the first model. This model does not find any significant evidence of an interaction effect between *CSR* and *COVID* on the dependent variables *Total firm risk*, *Systematic firm risk*, or *Idiosyncratic firm risk*.

The lack of a significant relationship can be caused by the high correlation between independent variables, or it can simply be non-existing. In the research of Huang and Ye (2021), the risk adverse effect of CSR during COVID-19 existed in overleveraged firms. The research method of Huang and Ye included a tercile sorting in level of overleverage, and the model of this research does not include this division between under- and overleveraged firms.

The effect of CSR during the 2008-2009 financial crisis that was discovered by Lins, Servaes, and Tamayo (2017) is explained as firm-specific social capital, that became important during the financial crisis of 2008-2009. The nature and complications of the 2008-2009 crisis is hard to compare to the lockdowns and supply chain difficulties stemming from the COVID-19 crisis. The role of firm-specific social capital can thus be different than it was during the 2008-2009 crisis.

Table 5.2.2: Regression outcomes H2

Variables	TotfirmRisk	SystfirmRisk	IdiofirmRisk
CSR	<b>-0.174*</b> (-1.790)	-0.094 (-0.272)	<b>-0.139*</b> (-1.860)
CSR * COVID	-0.067 (-0.547)	-0.158 (-0.362)	-0.039 (0.420)
Leverage	-0.007 (-0.124)	-0.452** (-2.188)	0.036 (0.798)
Size	-0.003 (-0.472)	0.037* (1.692)	-0.011** (-2.313)
MTB	0.002 (0.672)	0.005 (0.613)	0.002 (0.870)
ROA	-0.169 (-0.902)	0.686 (1.024)	-0.330** (-2.286)
COVID	0.147** (2.011)	-0.038 (-0.146)	0.096* (1.701)
SIT	-0.041* (-1.772)	-0.302*** (-3.695)	-0.016 (-0.906)
Constant	0.423*** (5.782)	0.943*** (3.609)	0.425*** (7.550)
Observations	165	165	165
Adjusted R <sup>2</sup>	0.237	0.091	0.305

\*, \*\* and \*\*\* correspond to the 0.1, 0.05 and 0.01 level respectively (2-tailed)

### 5.3 Robustness tests

#### 5.3.1 Industry type

For the first robustness test, we include *industry type* as a variable to differentiate between sensitive and less sensitive firms. For this regression, the sample is divided into two subsamples. The financial firms and firms that are considered controversial have properties that differ from less sensitive firms. Financial firms have high leverage (Fama & French, 1992), while firms operating in controversial industries have higher returns due to their higher litigation risk and being neglected by norm-constrained investors such as pension funds (Hong & Kacperczyk, 2009). The first subsample contains 15 sensitive firms from four different industries as shown in Table 5.3.1, while the second subsample contains 30 firms. The descriptive statistics of each subsample are presented in Table

5.3.2. The firms that make up the sensitive subsample and are working in a controversial or financial industry have lower mean firm risks, higher CSR- and size scores and a lower leverage than the non-sensitive subsample. The lower leverage is not expected based on the literature, where financial firms are often excluded from samples because of their high leverage (Fama & French, 1992) and a study suggest firms from controversial industries in the US have a mean leverage of 0.401 (Jo & Na, 2012)

For this robustness test, we are particularly interested in the subsample of non-sensitive firm. In Section 5.2.1, the regression result suggests that CSR reduces idiosyncratic- and total firm risk. This robustness check provides insight into the question if this effect indeed exists for non-sensitive firms, or if the effect is particularly strong in sensitive firms and thus creates a distorted view.

Table 5.3.1: Distribution sensitive firms, as categorized in Jo & Na (2012)

Alcohol	1
Banking	9
Biotech	3
Oil	3

The results of the regressions for the first robustness test are presented in Appendix F. To test the results of H1, where the independent variable *CSR* had a significant negative relationship with *Total firm risk* (-0.209\*\*\*) and *Idiosyncratic firm risk* (-0.160\*\*\*), the same model is used for each of the subsamples. For non-sensitive firms, the null hypothesis stating that *CSR* does not have an impact on the different aspects of firm risk cannot be rejected. The relationship between *CSR* and *Total firm risk* ( $p=0.337$ ) and *idiosyncratic firm risk* ( $p=0.258$ ) are both statistically insignificant.

For sensitive firms, the independent variable *CSR* does have a significant negative relationship with *Total firm risk* (-0.291\*\*) and *Idiosyncratic firm risk* (-0.205\*\*). The negative relationship between *CSR* and firm risk for sensitive firms is in line with previous literature and is potentially caused by the insurance-like nature of *CSR*, improved risk management, market appeal to customers, improved information transparency and easier access to financial markets (Jo & Na, 2012).

The null hypothesis of H2, where *CSR* does not have a significant relationship with the different aspects of firm risk during the COVID years, cannot be rejected. This relationship is also not found in the initial regression.

Table 5.3.2: Descriptive statistics subsamples

Variables	Non sensitive firms							Sensitive firms						
	N	Mean	Std.dev	Min	Median	Max	N	Mean	Std.dev	Min	Median	Max		
Total firm risk	108	0.358	0.137	0.137	0.341	0.868	57	0.311	0.151	0.160	0.261	0.924		
Systematic firm risk	108	1.003	0.468	-0.334	0.995	2.020	57	0.817	0.465	-0.334	0.810	2.079		
Idiosyncratic firm risk	108	0.304	0.113	0.135	0.283	0.683	57	0.257	0.102	0.126	0.235	0.577		
CSR Score	108	0.572	0.165	0.179	0.605	0.930	57	0.599	0.144	0.255	0.612	0.827		
Leverage	108	0.294	0.185	0	0.269	0.789	57	0.232	0.146	0.024	0.237	0.507		
Size	108	8.094	1.419	4.029	8.038	10.633	57	10.014	2.508	5.368	9.060	13.751		
Market to book	108	3.737	5.670	0.358	1.974	37.530	57	3.620	6.744	0.266	1.068	40.701		
ROA	108	0.029	0.069	-0.263	0.033	0.208	57	0.047	0.047	-0.061	0.049	0.227		

### 5.3.2 ESG transparency scores

For the second robustness test, the method of measuring the independent variable *CSR* is changed. For the initial regression the CSR scores are collected from the Thomson Reuters Refinitiv Eikon database, while the scores for this robustness test are collected from the transparency benchmark. This biannual benchmark for Dutch firms is an initiative from the Dutch government to score the 500 largest Dutch companies on different aspects of transparency.

The scores are based on self-assessments that are reviewed by a third party. This score does not indicate how much a firm is engaged in CSR, but how transparent they are about their CSR practices. Since this benchmark is biannual, we only use the data from financial year 2019 (pre-COVID) and 2021 (COVID) to compare the results from this robustness test with the results of the regression of this research.

The results of the regressions for the second robustness test are presented in Appendix G. After substituting the CSR scores with the ESG scores (both measured on a scale from 0-100) and using the scores from financial years 2018 and 2020 for our model, as explained in Section 3.4, the null hypothesis that states that the CSR transparency score does not have an impact on one of the aspects of firm risk cannot be rejected. The relationship between *CSR transparency* and *Total firm risk* ( $p=0.311$ ), *Systematic firm risk* ( $p=0.936$ ), and *Idiosyncratic firm risk* ( $p=0.320$ ) are not statistically significant. Evidence that these relationships can be significant is discussed by Boerrigter (2021), where the relationship between *CSR transparency* and *Total firm risk* ( $-0.001^{***}$ ), *Systematic firm risk* ( $-0.002^{***}$ ), and *Idiosyncratic firm risk* ( $-0.000^{***}$ ) in Dutch firms during the years 2014-2017 is discovered. Prior to 2017 the scores of the transparency benchmark were published on a yearly basis and measured differently (Boerrigter, 2021), which can be an explanation why the results of the regressions differ.

The null hypothesis of H2, where *CSR transparency* does not have a significant relationship with the different aspects of firm risk during the COVID years, cannot be rejected for the interaction effect between *CSR transparency* and *COVID* on total firm risk ( $p=0.320$ ), and idiosyncratic firm risk ( $p=0.606$ ). These relationships are also not found in the initial regression. However, while this regression does not find a significant relationship between *CSR transparency* and any aspect of firm risk, or a significant relationship between *COVID* and any aspect of firm risk, it does find a statistically significant relationship between the interaction effect of *CSR transparency* and *COVID* on *Systematic firm risk* ( $-0.829^{**}$ ). This effect follows the literature discussed in Section 2.2, where engagement in CSR practices creates social capital that can moderate the stock volatility of a firm during a crisis (Lins, Servaes, & Tamayo, 2017).

## Chapter 6: Conclusion and discussion

This chapter sets out the main findings of this study. Section 6.1 answers the main research question based on two hypotheses. The limitations of the study are discussed in Section 6.2. Lastly, Section 6.3 provides recommendations for further research.

### 6.1 Main findings

CSR is a topic of interest for academics, managers, and society. The role of a firm in society and the responsibilities that accompany this role became a relevant topic for discussion once more due to the outbreak of the COVID-19 pandemic. This health crisis changed the way people lived and worked and caused supply chain disruptions as a result of lockdowns. Following empirical research and theories, that found a negative relationship between CSR and firm risk, this research addresses the following question:

*What was the effect of CSR on the firm risk of Dutch listed firms during the COVID-19 crisis?*

To answer this research question, ordinary least squares regressions are conducted to examine two hypotheses. For the regressions we use the independent variable *CSR* and the dependent variables *Total firm risk*, *Systematic firm risk*, and *Idiosyncratic firm risk*, with 165 firm-year observations from the years 2018-2021. In addition, several control and dummy variables are used. To find the effect of CSR and the change in effect during pandemic, the research question is assessed by two hypotheses.

The first hypothesis states that CSR engagement reduces firm risk. This hypothesis is supported by the agency theory, following the reduction in information asymmetry caused by CSR disclosures (Richardson, Welker, & Hutchinson, 1999). Additionally, the negative relationship between CSR disclosures and firm risk is explained by the legitimacy theory. CSR activities are associated with lower unsystematic firm risk by conforming to institutional expectations, better access to resources, and insulations from scrutiny (Bansal & Clelland, 2004). Both CSR and the stakeholder theory expect a firm to create value for all its stakeholders. According to the stakeholder theory, CSR reduces firm risk by maintaining stable relationships with government and the financial community (McGuire, Sundgren, & Schneeweis, 1988), by increasing brand value and reputation from the consumer perspective (Cornell & Shapiro, 1987), and by gaining and retaining high quality work force from the employee perspective (Greening & Turban, 2000).

In line with the literature, significant negative relationships between the independent variable *CSR* and the dependent variable *Total firm risk* (-0.209\*\*\*) and between *CSR* and the dependent variable *Idiosyncratic firm risk* (-0.160\*\*\*) are found. For the relationship between the independent variable *CSR* and the dependent variable *Systematic firm risk*, the null hypothesis could



not be rejected and thus no significant relationship was found. This result is in line with the study of Boerrigter (2021), which used a similar research methodology. It found significant negative relationships between the independent variable *CSR* and the dependent variables *Total firm risk* and *Idiosyncratic firm risk*, while it found no evidence for a significant relationship between the independent variable *CSR* and the dependent variable *Systematic firm risk*.

The second hypothesis states that the effect of CSR on firm risk changed during the years of the COVID pandemic. According to Godfrey (2005), engagement in CSR creates a form of goodwill for the firm that acts as ‘insurance-like’ protection when negative events occur. Empirical studies suggest that CSR created this protection by establishing firm specific social capital during the 2008-2009 financial crisis (Lins, Servaes, & Tamayo, 2017), and that CSR had a negative effect on both stock volatility and bankruptcy risk in overleveraged firms during both the COVID-19 crisis. Although the results of the regressions suggest a negative relationship between the interaction variable *CSR \* COVID* and the different aspects of firm risk, the null hypothesis that states that there is no significant relationship cannot be rejected.

The robustness test where the sample was divided in two subsamples based on industry type suggest that the impact of the independent variable ‘CSR’ on the dependent variables is strongly influenced by the inclusion of sensitive firms. The robustness test that assessed the CSR transparency score did not result in a significant relationship between the independent variable ‘CSR transparency’ and the dependent variables. The results of these robustness tests can only be used as an indication, as explained in the discussion in Section 6.2.

To answer the question about the effect of CSR on the firm risk of Dutch listed firms during the COVID-19 crisis, the conclusion can be given that engagement in CSR activities does have a significant negative impact on the level of total firm risk and level of idiosyncratic firm risk. This impact is stronger in firms from industries that are classified as sensitive following Jo & Na (2012). No evidence is found that the effect of CSR on the firm risk of Dutch listed firms differed significantly during the COVID-19 years compared to the pre-COVID years.

This study contributes to the existing literature by confirming the negative effect of CSR activities on firm risk for Dutch listed firms, as found by Boerrigter (2021). Furthermore, this study provides managers of Dutch listed firms insightful directions on their engagement in CSR activities. By engaging in CSR, and thus taking on the responsibility for social, environmental and/or governance concerns, they may expect a small decline in total- and idiosyncratic firm risk. Therefore, from a risk perspective, managers should not be afraid to contribute to a better tomorrow.

## 6.2 Limitations

Despite the statistically significant relationships between the independent and dependent variables in the regression models, there are some limitations that need to be discussed in this section.

The sample size of this research is fairly small compared to similar research in published articles. For example, the dataset of Huang & Ye (2021) contained around 29,000 observations, and the dataset of Jo & Na (2012) contained around 2,700 observations compared to the 165 firm year observations of the dataset in this thesis. More firm year observations lead to higher reliability, as exemplified by Cohen (1992) in Section 5.1. Unfortunately, there is no abundance of listed Dutch firms with available CSR scores. Since the dataset is split for the first robustness test, and the independent variable of the second robustness test was provided biannually, we use even smaller sample sizes for the robustness tests compared to the main sample. Some of the null hypotheses potentially could have been rejected if the number of observations was increased, since the chance for a Type II error would have been reduced.

Apart from potential type II errors, the low sample size can be a cause of the poor model fit. This can also be caused by omitted variables. For example, the independent variable CSR in this study consist of a weighted sum of environment, social, and governance scores calculated by Refinitiv Eikon. Research with a similar sample and methodology found that only environmental CSR disclosure had a significant negative relationship on firm risk (Boerrigter, 2021). Increasing the number of relevant and uncorrelated control variables can prevent endogeneity issues and improve model validity. Some outside influences are not included in the model, such as the support package that were issued by the Dutch government during the COVID-19 pandemic. These aid packages included relaxed tax provisions and supplemental lines of credit, to ensure companies were able to pay their wages (Government of the Netherlands, 2020). These aid packages possibly affect the insurance-like protection of CSR during the crisis. Another event that potentially influenced the dataset without being accounted for is the 2021 obstruction of the Suez Canal in Egypt, which caused major disruptions in the supply chains of firms that rely on trade with Asia.

## 6.3 Future research

Based on the main limitation of this research, namely the data availability, future research on this topic should consider increasing the number of firm observations. This can be done by increasing the years of the sample as the data becomes available. Another way to increase the dataset is to extend the research to a group of countries, such as the Benelux, with similar characteristics. Lastly, the dataset could be expanded by including data from private firms. The

method of measuring the variables in this research cannot be directly applied to private firms since they are not obligated to share financial information in the way listed firms do.

During the robustness test with the sensitive and non-sensitive subsamples, a significant negative relationship was found between the dependent variable *CSR* and the independent variables *Total firm risk* and *Idiosyncratic firm risk*. Therefore, a suggestion for future research is to focus on what aspects of CSR have negative impact on firm risk for either sensitive or non-sensitive firms.

Lastly, we suggest that future research includes data from the post-COVID years, as it could provide insight for a future crisis. This study focuses on the effect of CSR on firm risk during the COVID-19 pandemic and assessed whether the effect on firm risk differed substantially from the pre-COVID years. The study did not provide evidence for this discrepancy. However, a suggestion for future research is to include data from the post-COVID years. Firms threatened by financial distress might choose to discontinue or reduce CSR engagements to retain cash flows. Researching if and how CSR impacted firm risk in the aftermath of COVID-19 can provide insight for a future crisis. Can CSR be switched off during times of financial hardship without damaging effects, or should it be continued to prevent future decline in brand value and relationships with various stakeholders?

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## Appendix A: List of firms

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AALBERTS NV  
ABN AMRO BANK N.V  
ADYEN  
Aegon  
Ahold Del  
Akzo Nobel  
ALFEN  
AMG  
ARCADIS  
ASM International  
ASML Holding  
ASR NEDERLAND  
BAM GROEP KON  
Basic Fit  
BE SEMICONDUCTOR  
BRUNEL INTERNAT  
CORBION  
EURONEXT  
FLOW TRADERS  
FORFARMERS  
FUGRO  
HEINEKEN  
IMCD  
ING GROUP NV  
Just Eat Takeaway  
KENDRION  
KPN KON  
NN GROUP  
NSI NV  
OCI  
Pharming group  
Philips KON  
POST NL  
Randstad NV  
SBM OFFSHORE  
SHELL PLC  
SIF HOLDING  
SIGNIFY NV  
TKH GROUP  
TOMTOM  
VASTNED  
VEON  
VOPAK  
WERELDHAVE  
Wolters KLUWER

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## Appendix B: Distribution of variables

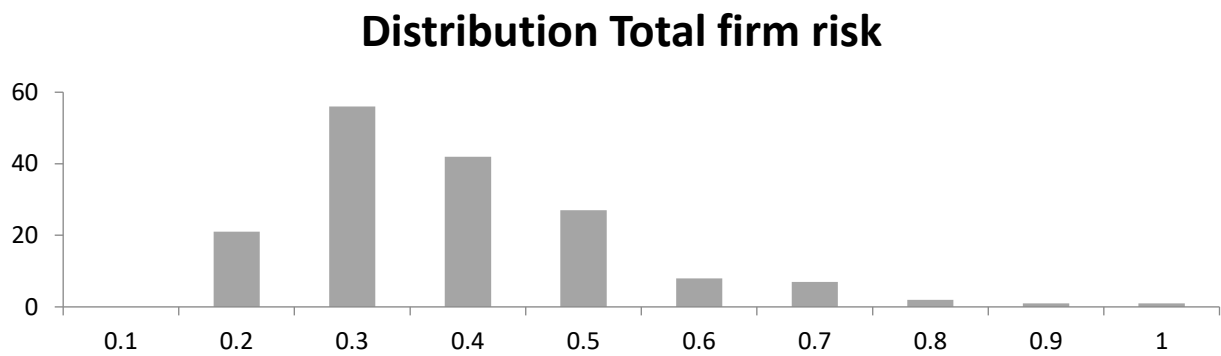


Figure B.1: Distribution of Total firm risk

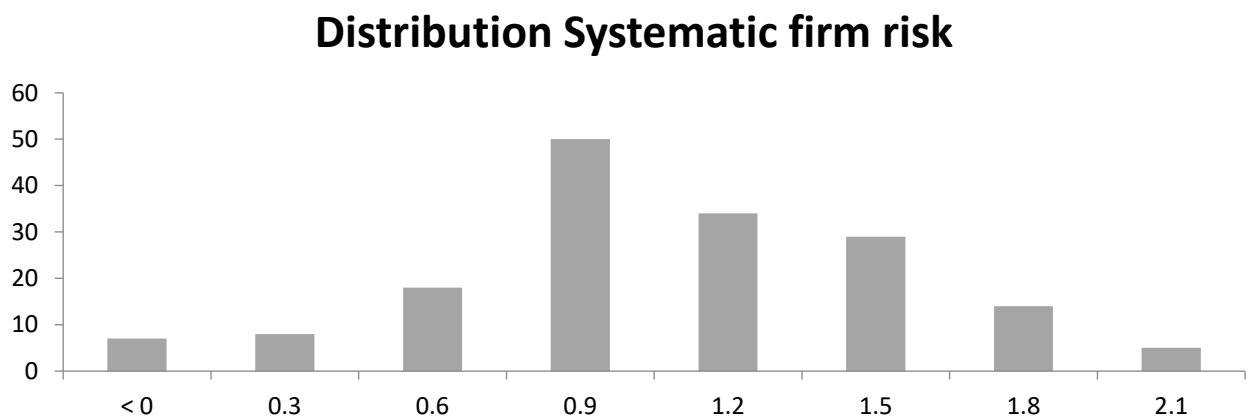


Figure B.2: Distribution of Systematic firm risk

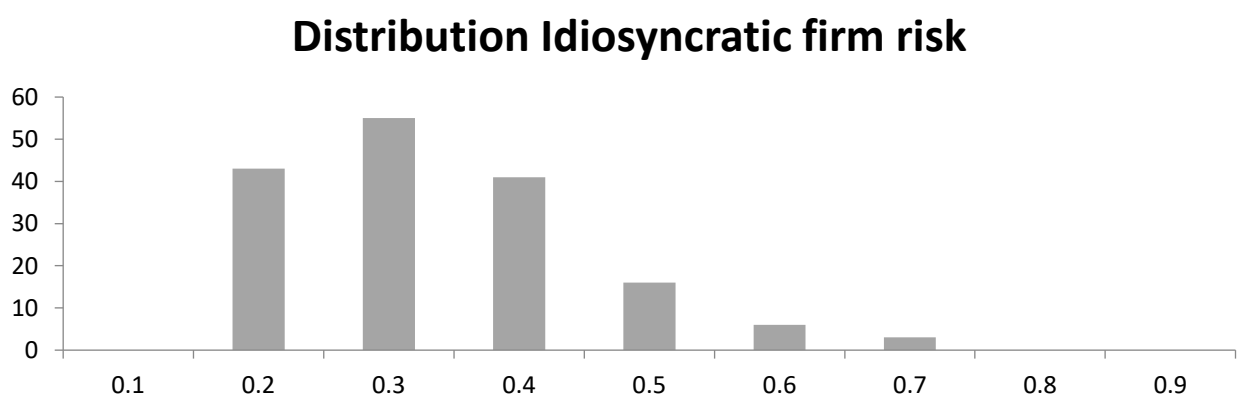


Figure B.3: Distribution of Idiosyncratic firm risk

## Distribution Leverage

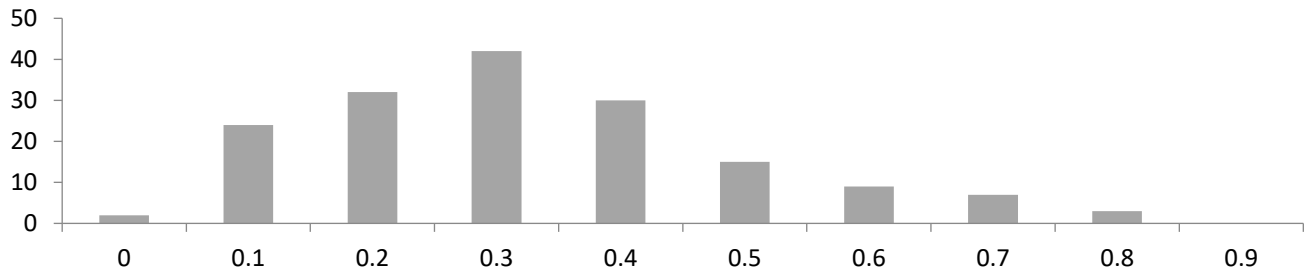


Figure B.4: Distribution of Leverage

## Distribution Size

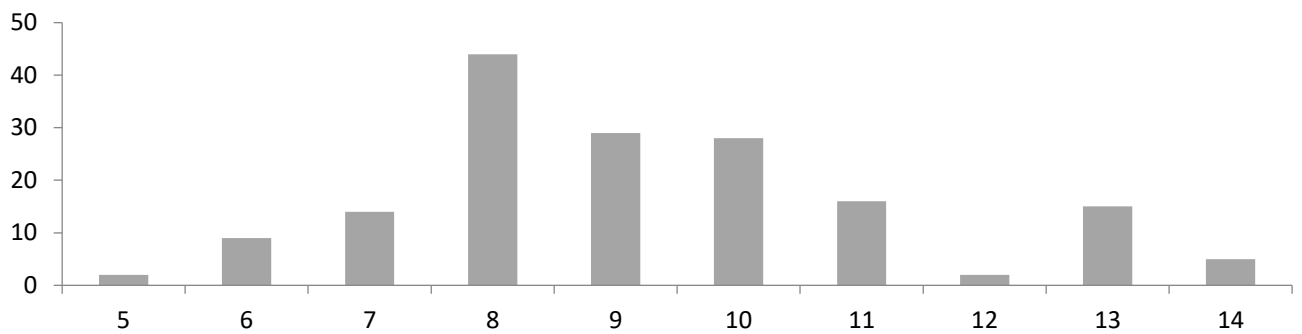


Figure B.5: Distribution of Size

## Distribution MTB

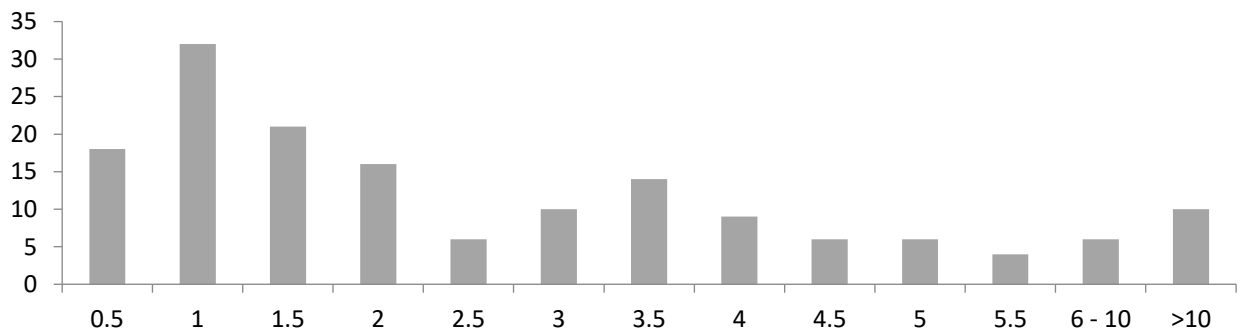


Figure B.6: Distribution of Market to book value

## Distribution ROA

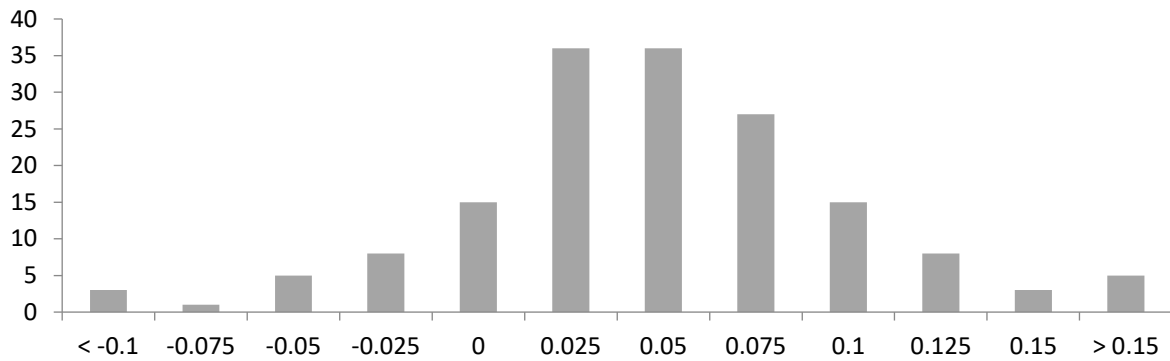


Figure B.7: Distribution Return on assets

## Distribution CSR scores

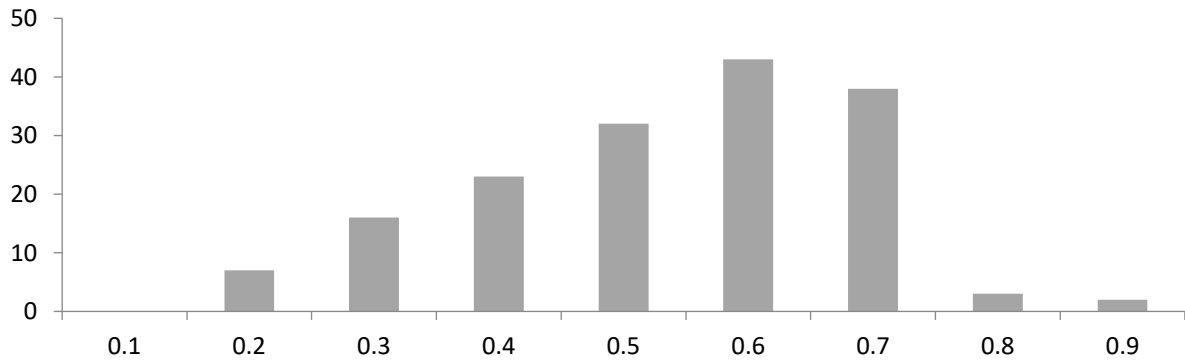


Figure B.8: Distribution of CSR-scores

## Distribution CSR - Trans

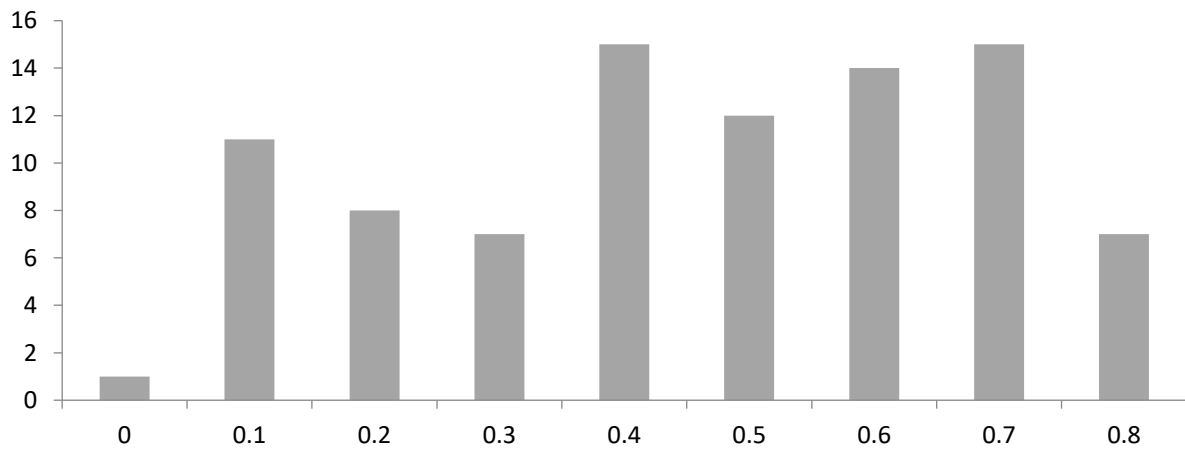


Figure B.9: Distribution of CSR transparency scores

## Appendix C: Assumption of linearity

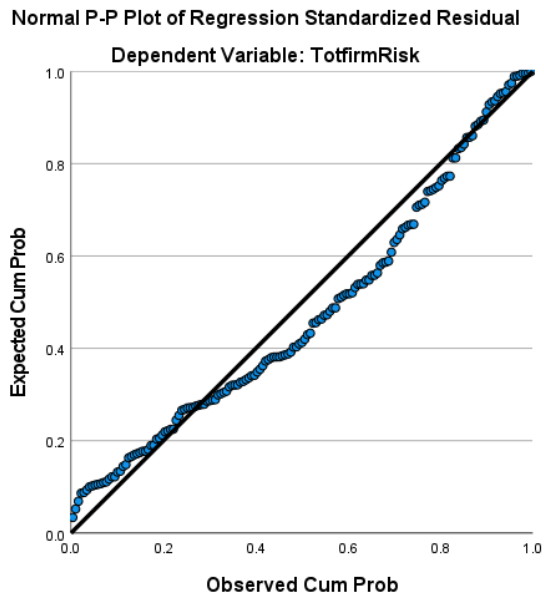


Figure C.1: P-P plot of TotfirmRisk

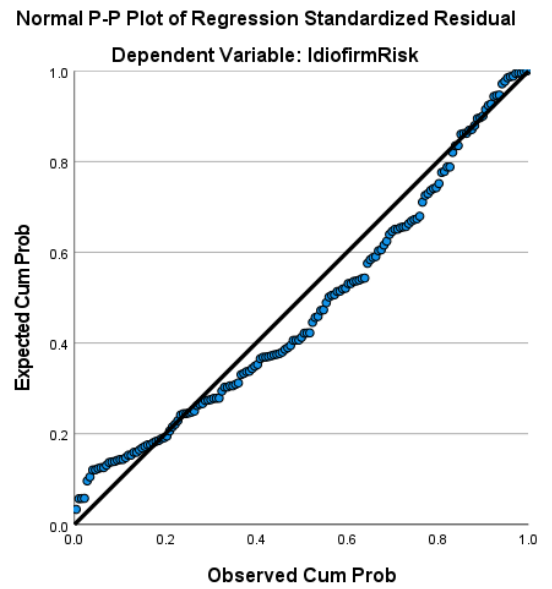


Figure C.2: P-P plot of IdiofirmRisk

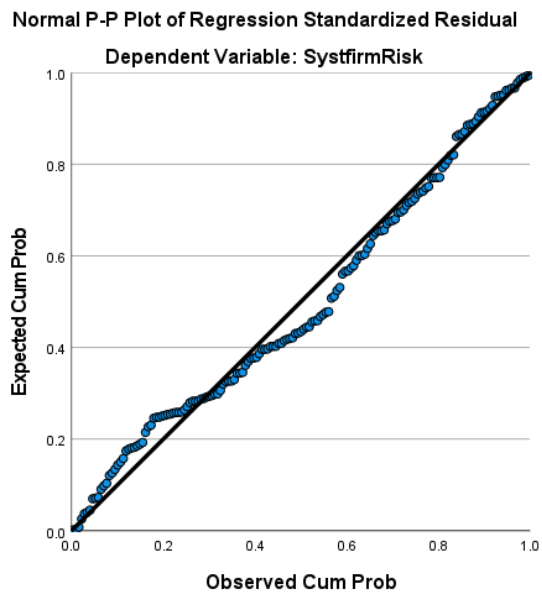


Figure C.3: P-P plot of SystfirmRisk

## Appendix D: Assumption of constant variance

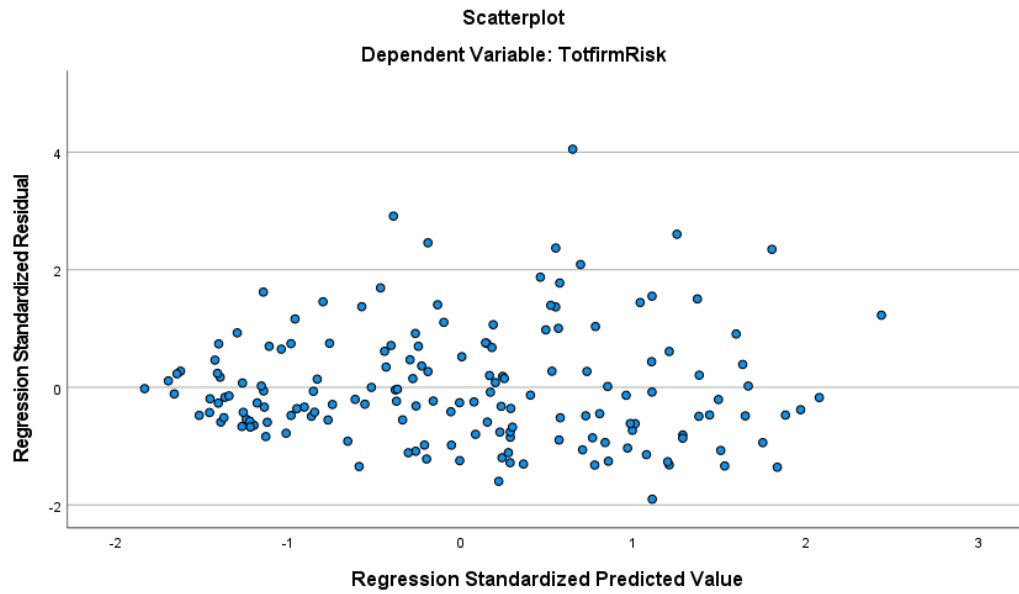


Figure D.1: Scatterplot TotfirmRisk

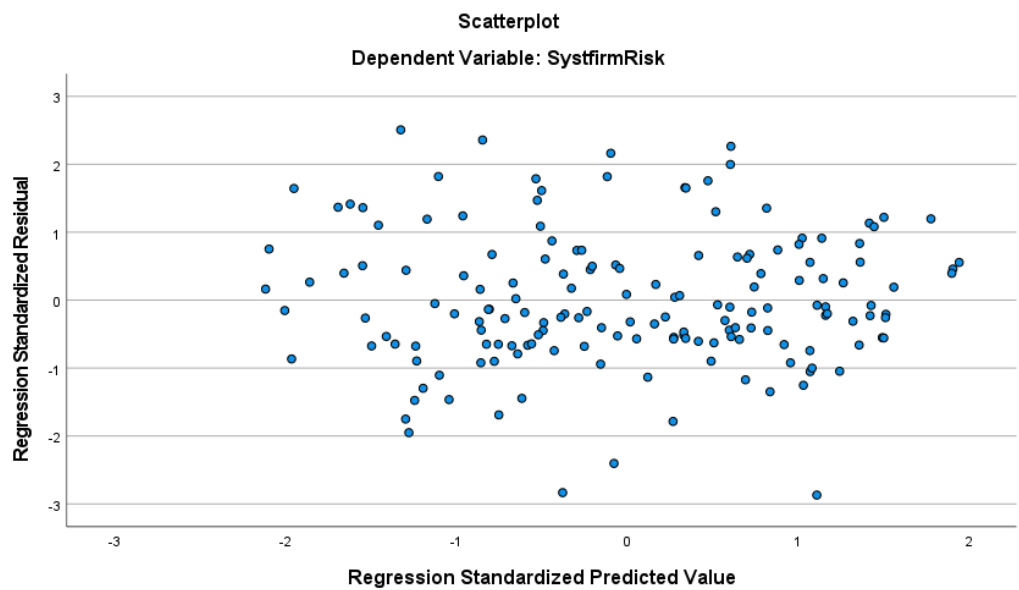


Figure D.2: Scatterplot SystfirmRisk



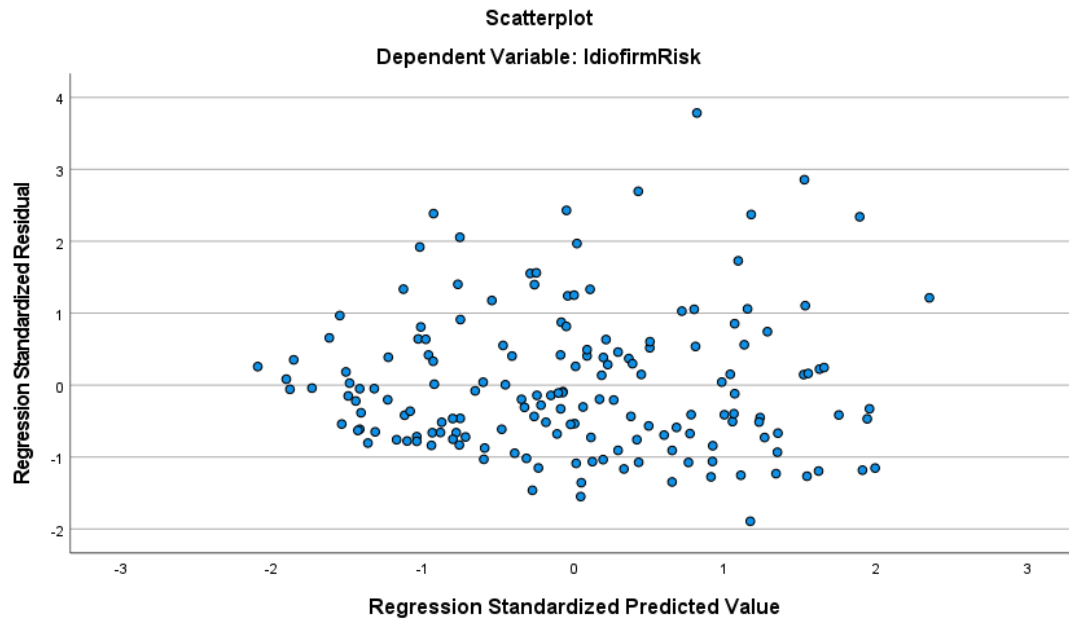


Figure D.3: Scatterplot IdiofirmRisk

## Appendix E: Regression excluding financial firms

Table E.1: Regression results of sample where financial firms are excluded

<b>Variables</b>	<b>SystfirmRisk</b>
CSR	-0.120 (-0.432)
Size	-0.003 (-0.099)
MTB	0.001 (0.109)
ROA	1.028 (1.530)
Leverage	-0.318 (-1.457)
COVID	-0.125* (-1.755)
Constant	1.239*** (5.456)
Observations	135
Adjusted R <sup>2</sup>	0.071

## Appendix F: Regression results of robustness test 1

Table F.1: Robustness test H1 with non-sensitive firms

Variables	TotfirmRisk	SystfirmRisk	IdiofirmRisk
CSR	-0.094 (-0.965)	0.336 (1.010)	-0.086 (-1.138)
Size	-0.026** (-2.416)	-0.064* (-1.728)	-0.027*** (-3.227)
MTB	0.002 (0.568)	0.004 (0.381)	0.001 (0.458)
ROA	-0.219 (-1.037)	1.124 (1.555)	-0.409** (-2.474)
Leverage	0.062 (0.888)	-0.200 (-0.841)	0.082 (1.508)
COVID	0.088*** (3.640)	-0.132 (-1.596)	0.052*** (2.740)
Constant	0.557*** (7.142)	1.429*** (5.356)	0.529*** (8.675)
Observations	108	108	108
Adjusted R <sup>2</sup>	0.220	0.056	0.301

Table F.2: Robustness test H1 with sensitive firms

Variables	TotfirmRisk	SystfirmRisk	IdiofirmRisk
CSR	-0.291** (-2.420)	-0.300 (-0.645)	-0.205** (-2.411)
Size	0.012 (1.279)	0.089** (2.513)	0.002 (0.363)
MTB	-0.001 (-0.146)	0.021 (1.304)	0.000 (0.137)
ROA	0.692 (1.511)	-0.316 (-0.179)	0.544* (1.685)
Leverage	-0.113 (-0.849)	-0.101 (-0.195)	-0.050 (-0.530)
COVID	0.145*** (4.716)	-0.208* (-1.758)	0.111*** (5.130)
Constant	0.278** (2.043)	0.194 (0.370)	0.278*** (2.898)
Observations	57	57	57
Adjusted R <sup>2</sup>	0.285	0.170	0.360

Table F.3: Robustness test H2 with non-sensitive firms

<b>Variables</b>	<b>TotfirmRisk</b>	<b>SystfirmRisk</b>	<b>IdiofirmRisk</b>
CSR	-0.041 (-0.327)	0.469 (1.085)	-0.053 (-0.533)
CSR*COVID	-0.098 (-0.651)	-0.250 (-0.485)	-0.063 (-0.536)
Size	-0.026** (-2.403)	-0.064* (-1.717)	-0.027*** (-3.210)
MTB	0.002 (0.668)	0.004 (0.456)	0.001 (0.541)
ROA	-0.222 (-1.049)	1.116 (1.538)	-0.411** (-2.476)
Leverage	0.067 (0.953)	-0.187 (-0.778)	0.085 (1.553)
COVID	0.143 (1.612)	0.011 (0.035)	0.088 (1.257)
Constant	0.524*** (5.664)	1.347*** (4.245)	0.509*** (7.011)
Observations	108	108	108
Adjusted R <sup>2</sup>	0.215	0.049	0.296

Table F.4: Robustness test H2 with sensitive firms

<b>Variables</b>	<b>TotfirmRisk</b>	<b>SystfirmRisk</b>	<b>IdiofirmRisk</b>
CSR	-0.301* (-1.903)	-0.318 (-0.521)	-0.228** (-2.047)
CSR*COVID	0.020 (0.096)	0.038 (0.047)	0.048 (0.330)
Size	0.012 (1.270)	0.089* (2.486)	0.002 (0.378)
MTB	-0.001 (-0.145)	0.021 (1.291)	0.000 (0.134)
ROA	0.698 (1.493)	-0.304 (-0.168)	0.561* (1.701)
Leverage	-0.114 (-0.845)	-0.102 (-0.196)	-0.052 (-0.547)
COVID	0.133 (1.052)	-0.231 (-0.473)	0.083 (0.928)
Constant	0.283* (1.926)	0.204 (0.359)	0.290*** (2.803)
Observations	57	57	57
Adjusted R <sup>2</sup>	0.270	0.153	0.348

## Appendix G: Regression results of robustness test 2

Table G.1: Robustness test H1 with CSR-Trans scores

<b>Variables</b>	<b>TotfirmRisk</b>	<b>SystfirmRisk</b>	<b>IdiofirmRisk</b>
CSR-Trans	-0.043 (-1.019)	-0.021 (-0.080)	-0.038 (-1.001)
Size	-0.013** (-2.611)	0.032 (1.081)	-0.017*** (-3.974)
MTB	0.001 (0.815)	0.005 (0.466)	0.001 (0.588)
ROA	-0.299* (-1.915)	1.693* (1.784)	-0.500*** (-3.605)
Leverage	-0.039 (-0.883)	-0.516* (-1.900)	-0.012 (-0.292)
COVID	0.007 (0.487)	-0.219** (-2.366)	0.006 (0.408)
SIT	-0.038 (-1.171)	-0.585*** (-2.948)	-0.000 (-0.014)
Constant	0.435*** (9.356)	0.916*** (3.242)	0.434*** (10.505)
Observations	90	90	90
Adjusted R <sup>2</sup>	0.231	0.180	0.318

Table G.2: Robustness test H2 with CSR-Trans scores

<b>Variables</b>	<b>TotfirmRisk</b>	<b>SystfirmRisk</b>	<b>IdiofirmRisk</b>
CSR-Trans	-0.008 (-0.140)	0.404 (1.225)	-0.021 (-0.432)
CSR-Trans*COVID	-0.069 (-1.001)	-0.829** (-2.006)	-0.032 (-0.518)
Size	-0.013** (-2.611)	0.032 (1.101)	-0.017*** (-3.957)
MTB	0.002 (0.874)	0.006 (0.594)	0.001 (0.616)
ROA	-0.286* (-1.829)	1.844* (1.972)	-0.494*** (-3.535)
Leverage	-0.039 (-0.866)	-0.507* (-1.901)	-0.011 (-0.282)
COVID	0.042 (1.112)	0.198 (0.873)	0.022 (0.637)
SIT	-0.038 (-1.174)	-0.586*** (-3.007)	0.000 (-0.016)
Constant	0.417** (8.372)	0.702** (2.361)	0.426*** (9.574)
Observations	90	90	90
Adjusted R <sup>2</sup>	0.231	0.209	0.312