Handelshøyskolen BI

GRA 19703 Master Thesis

Thesis Master of Science 100% - W

Predefinert informasjon

Startdato:	09-01-2023 09:00 CET	**Termin:**	202310
Sluttdato:	03-07-2023 12:00 CEST	**Vurderingsform:**	Norsk 6-trinns skala (A-F)
Eksamensform:	T		
Flowkode:	202310||11184||IN00||W||T		
Intern sensor:	(Anonymisert)		

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Informasjon fra deltaker

Tittel *:	American cash - ESG and cash holdings in S&P 1500 firms
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Inneholder besvarelsen konfidensielt materiale?:	Nei	**Kan besvarelsen offentliggjøres?:**	Ja

Gruppe

Gruppenavn:	(Anonymisert)
Gruppenummer:	121
Andre medlemmer i gruppen:	

American cash - ESG and cash holdings in S&P 1500 firms

Master Thesis

by
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MSc in Business, major in sustainable finance

Oslo, July 3, 2023

ABSTRACT

We study the relationship between ESG and cash holdings in US S&P 1500 firms. We find that the marginal market value of cash holdings and the impact of ESG varies based on investors' expectations and the context in which firms operate. We find that responsible firms with high ESG have excess cash holdings valued positively. Low-ESG firms signals a heightened risk of agency problems and excess cash holdings are valued negatively. We also show that this effect diminishes when shareholder protection is low. After controlling for ESG, excess cash holdings are seen as idle investments or subject to misuse, thus being devalued. Having insufficient cash holdings in combination with high ESG is negatively impacting firm value since ESG investments are viewed as irresponsible when firms are illiquid. We find a generally negative impact from ESG performance on firm value, which turns positive during the Covid-19 pandemic. Financial crises are surrounded by information asymmetry and lower trust. High ESG signals trust in this context, hence ESG is a mitigating factor during the Covid-19 crisis.

Acknowledgements

We would like to express our heartfelt gratitude to BI Norwegian Business School for providing us with an exceptional educational journey over the past five years. The experience we have gained during our time at this esteemed institution has been invaluable and has shaped us into the professionals we are today. First and foremost, we extend our deepest appreciation to our professors for their unwavering dedication, extensive knowledge, and unwavering support throughout our academic endeavors. And a special thank you to our Thesis' supervisor Mr. Graniero for dedication, support and patience. Their commitment to excellence and passion for teaching have inspired and motivated us to strive for greatness. We are immensely grateful for their guidance, mentorship, and the countless hours they have invested in nurturing our growth.

Contents

List of Tables

1 Introduction and motivation

"We like firms that splashes cash" (Furuseth w.y., *own translation*). These are the words of the famous Norwegian investor and stockbroker Jan Petter Sissener. Firms with abundant cash holdings sounds attractive and something one would think all investors would prefer. While Sissener's reasoning behind this statement is more nuanced, we were curious to see if the statement uncontextualized is that simple. Is having large cash holdings always positive? We find the impact of qualitative elements such as the behavior of managers and market participants interesting. Professional researchers have found elegant ways to measure the market value of cash holdings and ESG, and we find great motivation in recreating and testing these relationships.

In this thesis we study how the market values firms' cash holdings under different circumstances. More specifically, we study the role of firms' Environmental, Social and Governance (ESG) performance, cash holdings and the interaction between them. We study how they impact firm value and performance on US S&P 1500 firms. As we will show in the literature review, the market values cash holdings depending on how it expects these assets to be used. If a trustworthy firm with strong corporate governance mechanisms holds more cash, we are inclined to believe investors will put a higher value on these resources. We lean on other researchers' econometric models and results to test the relationship between ESG performance, cash holdings and firm value. We find that higher ESG performance is associated with a higher marginal value of cash. The assumption behind this result is that responsible firms signal trust and reduced risk of managerial expropriation of shareholders. Thus, the risk of cash resources being used unproductively is lower. The perceived probability of effective employment of cash prevails and

cash holdings is valued at a premium by investors.

We also test the same effect on illiquid firms. Unconditionally, firms with insufficient cash holdings have a lower market value in our sample. When we introduce the ESG component, the coefficient sign changes from negative to positive. Having lower levels of cash is associated with firms being efficient in investing in growth opportunities. The interaction between high ESG and low cash is negative on firm value. Financial constraints and ESG investments do not mix well in the eyes of investors.

Two important drivers behind investors' valuation of cash holdings are the beforementioned ESG performance, and the imbedded corporate governance mechanisms. In corporate governance, shareholder protection is an important element. The level of shareholder protection is often measured at country-level through legislation and institutional quality. In a high-shareholder protection environment, there are nation-wide corporate governance mechanisms in place that reduces a manager's ability to expropriate shareholders. When shareholder protection is high, investors might view high ESG investments and management of stakeholders as way of mitigating conflict between the firm and its shareholders. The firm signals its commitment to creating value for shareholders through improving ESG. The opposite view is the agency motive behind hoarding cash and investing in ESG. In the presence of agency problems, management may use these cash holdings to extract private benefits and entrench themselves through investments in ESG. High shareholder protection will limit the ability to inflict these agency costs. While most of the literature we find focuses on cross-border differences in shareholder protection to measure this effect, we test whether firm-specific variation in shareholder-protection may have an

impact on this effect on American firms. Professional researchers find that the effect of ESG on cash holdings vanishes when shareholder protection on a geographical level is low. We find the same effect on firm-level. We use a specific shareholder element of the overall Refinitiv/Asset4 ESG score as a proxy to group our portfolio into high and low shareholder protection. This proxy is an overall rating of how firms treat their shareholders. We remove the shareholder element from the ESG rating to not bias our results by indirectly subsampling our portfolios in high/low ESG rating.

Further, we investigate whether ESG performance isolated influence firm performance. This concept is large in the finance literature, and many professional researchers finds both a positive and negative impact from ESG on firm value. Recent research shows that there are geographical differences in how investors value ESG. North American firms seems to have their ESG performance priced negatively. Our results suggest the same.

The findings above comes from a model specification on a general level. They do not consider investors preferences during market crashes such as the financial crisis of 2007/2008 and the Covid-19 market meltdown of the first quarter of 2020. We adopt another model that tests raw and abnormal buy-and-hold returns during Q1 2020 to see whether investors' valuation of ESG and cash holdings are different during market crises. The model measures ESG, cash holdings and several control variables at the end of 2019, as close as possible to the market crash. We find a positive relationship between ESG and returns, in contrast to the first model that measures this relationship on a general basis. A market crash increases information asymmetry and impacts the public's trust in firms. High ESG performance may act as a signal of trust during these times, thus investors prefer

high-ESG firms. Our results suggest that the effect from ESG on returns comes from the environmental and social categories of ESG, also defined as the CSR categories.

We further find that having excess cash holdings before the crisis is associated with better returns. We do find a weak interaction-effect between ESG and cash holdings. This effect is interpreted as higher cash holdings enables firms to invest in improving ESG, and in turn perform better on the market. Unfortunately, we see the effect in our model as too weak to draw a conclusion.

Having insufficient cash holdings right before the Covid-19 crisis does not have an effect on firm performance in our specification. The same result is found for the ESG variable. We argue that this result is due to illiquid firms being more reliant on raising debt to endure a period of liquidity crisis as the Covid-19 pandemic caused. We find a consistently negative impact from levels of short-term debt and interest rates on these firms. For firms with excess cash holdings before the crisis, this effect is absent with the same consistency. As firms with lower liquidity assumably reduces investments in ESG to maintain operational stability, these firms do not have the luxury of enjoying the positive impact from ESG on performance. To underline this, we employ a model with quartile dummies for ESG level. We find that the ESG impact is only significant on higher levels of ESG. This result underlines the findings of researchers that find a U-shaped impact from ESG on firm performance. Lower levels of ESG does not seem to have an effect. As ESG performance regresses in these firms, the costs of ESG outweighs its benefits.

This thesis is organized as follows. In part 2 we go through the relevant literature, while in part 3 we formulate our hypotheses. Part 4 is the methodology we use to conduct our research. We also describe our results and discuss them and our assumptions in part 4. In part 5 we conclude and try to identify potential limitations to our approach.

2 Literature review

In the literature review we expand on the concept of corporate social responsibility (CSR) and ESG. It may seem that we use ESG and CSR interchangeably, but there is a small difference in interpretation. CSR is focused on the enviromental and social impact of firms. ESG also have the governance element explicity. In CSR, the governance element is interpreted implicity in how it impacts the E&S factors (Chang et al. (2022)). In our research we use ESG ratings as our measure of responsible firms and corporate governance.

2.1 Cash holdings and principal-agent theory

In corporate governance, the theory about agents and agency costs has been subject for a vast body of research. What motivates the CEO of a company to consistently act in the best interest of the shareholders, and how can the shareholders ensure this? Complete contracts have been proposed, albeit an impossibility given the vast number of elements such a contract must contain. The agency problems occur when the agent's (CEO) self-interest diverges from the shareholder's interests. A possible solution is to make sure all parties' interests are aligned by incentivizing the CEO through remuneration policies. Even then, there may be some agency problems present. When mixing agency problems together with large holdings of cash, investors may have reason to be concerned. Is there a risk of management misusing the firm's cash?

There are different degrees of severity in these agency problems. CEO's may buy company jets for personal use and other direct value-destroying acquisitions. Or they may donate cash to charities they personally are affiliated to. A more complex view of the principal-agent theory is the management of stakeholders, or so-called stakeholder-relations. Freeman (1984) presented the term

stakeholders in his influential paper, *Strategic management: a stakeholder approach*. It expands on the view of shareholders and include other parties that may have an attachment or a stake in the firm. Such stakeholders may be suppliers and communities, amongst others. Stakeholder relations may either come at a cost for the shareholders (Blair and Stout (1999)), or they may be viewed as a positive net present value activity. This depends on who you ask. If we ask Milton Friedman, stakeholder relations are not something firms should concern themselves with. According to Friedman, shareholders' money should be used to maximize shareholder value (Friedman (1970)). Others may see CSR as a tool to reduce risk or as a form of advertisement. CEOs through their firms have been catering to these stakeholders in different ways. A common application is through donations to charities, but firms may also have a Corporate Social Responsibility (CSR) strategy implemented within the firm. One of the questions that may arise is where the motivation behind these activities comes from. Are these donations or other CSR activities motivated by financial performance or are they a manifestation of an agency problem?

2.2 ESG, cash holdings and their relationship

CSR performance is proven to have an impact on the value of firms, as recent studies have shown (Guo et al. (2020);Zhang et al. (2022)). Other researchers have also found that CSR has an impact on the value of cash holdings as well (Arouri and Pijourlet (2017)). In their findings, using a sample of firms from 34 countries, and with data from 2005 until 2009, Arouri & Pijourlet (2017) found evidence that if firms have a higher CSR rating, cash holdings would be valued higher by the investors.

These results can be interpreted as reduced agency problems proxied by higher CSR ratings that will mitigate some problems related to managers that do not act on behalf of the shareholders. In this way, shareholders show more faith in the managers, trusting that they will not use cash holdings for

private benefits. This is consistent with what Arouri & Pijourlet (2017) describe as the conflict resolution-view. They outline two types of motivations for investing in CSR. The conflict-resolution view is a way for managers to resolve conflicts with shareholders through strategic management of stakeholders. Under this view the manager is motivated by financial performance. The opposite motivation is the agency motive, where the manager is motivated by extracting private benefits.

Another interpretation can also be explained by Masulis and Reza (2015), where they adopted a method developed by Faulkender and Wang (2006) to look at how investors valued the cash holdings of firms. Cash holdings are a great source of financing, enabling firms to quickly make investments without having to access external financing, thereby reducing transaction costs and costs associated with the attached asymmetric information. On the other hand, investors may as well be inclined to de-value or discount the value of cash holdings in firms if they believe that these cash holdings are subject to misuse. This is because retained cash is an available source for a CEO to use to extract private benefits at the expense of shareholder value. Masulis and Reza (2015) found that corporate giving had a substantial impact on firm value through the value of cash. If a firm had non-independent boards and weaker oversight (agent monitoring), this effect more than doubled. To summarize, these findings were consistent with the hypothesis that shareholders anticipate the cash holdings to be misused when charitable donations grow.

Masulis, Wang, and Xie (2009) used the same methodology with cash holdings to examine whether a divergence between insider ownership and insider control represented agency problems. Insider ownership is defined as insider/CEO

cash flow-rights. Insider control is defined as insider/CEO voting rights. They found that a divergence between the two types of insider ownership (more voting power than cash flow-rights) in dual-class companies led to managers pursuing more private benefits. If the manager owned more voting rights than cash flow rights the managers' compensation was higher, and the market valued the firm's acquisitions more negatively.

There is also another causality between ESG and cash holdings documented in the literature. Researchers have found that ESG performance affects levels of cash holdings. Liu, Johl, and Lasantha (2023) found that ESG negatively impacted levels of cash holdings indirectly through trading mechanisms, while Atif and Nadarajah (2022) found a link between ESG disclosure and lower cash holdings. These firms also had a higher performance and valuation of cash. The assumption is that high-ESG firms are better at managing their cash resources as the ESG performance reduces agency conflicts associated with cash management. The different categories of ESG impact cash holdings differently. Barros, Falcao, and Sarmento (2022) found that higher ratings in the social and environmental categories were significant in explaining how firms could operate with lower investments in working capital. Interestingly, the governance category did not have such an effect.

2.3 Shareholder protection

Shareholder protection is the level of protection shareholders of a company has against expropriation by either management or large shareholders. Researchers have found that the level of shareholder protection has an impact on how investors value liquid assets in firms. Shareholder- or investor protection can be measured with different proxies. For instance as the difference in regulatory environments between countries (Rossi and Volpin (2004)), or by using derivate lawsuits as a proxy, as (Houston et al. (2018))

did. From this 2018 paper, the researchers find that reduced litigation rights increase firms' cost of capital, through increased agency problems. The authors of this paper used data from 23 US states in the period from 1985 until 2013, tracking derivative lawsuits as a proxy for shareholder protection. Agency problems are defined as problems related to the separation of ownership and control, often resulting in managers taking action to serve their own private benefits on behalf of the shareholders. They found that when there is a decrease in shareholder lawsuits resulting from the adoption of UD (universal-demand) laws, it leads investors to demand higher returns and consequently influencing the cost of capital.

The link between shareholder rights and cost of capital is also examined by Chen, Chen, and Wei (2011), where they investigated its influence on the implied cost of equity. The researchers have in this paper used observations from US companies between 1990 until 2004, totaling more than 13,000 firm-year observations. They define shareholders rights by the Governance Index ("G-index")[1], constructed by (Gompers et al. (2003)) The result from the study confirms that anti-takeover provisions are significantly related to the cost of equity, meaning that shareholder protection and agency problems could influence the value of equity in a negative manner.

Pinkowitz, Stulz, and Williamson (2006) examined the relationship between cash holdings, dividend payments, firm value, and corporate governance practices. One of the factors they investigated was the influence of country-level factors. In this relationship, the authors found that countries with strong legal systems and investor protection mechanisms may provide a

[1]Gompers, Ishii and Metrick (GIM) (2023) created tge "G-index", which denotes the number of antitakeover provisions in corporate charters and bylaws. Strong shareholder rights mean a lower G-index, and the opposite. Lower G-index resulted in higher realized stock returns

more favorable environment for the shareholders. The variance from one country to the other had an impact on how cash holdings and dividend policies contributed to firm value.

Following Pinkowitz et al. (2006), Arouri and Pijourlet (2017) also tested the level of shareholder protection and its impact on the valuation of cash resources. As strong shareholder protection prevents a manager from destroying firm value, higher levels seem to determine to what extend managers have the ability to pursue their own interests. Following this argument, the level of shareholder protection will also have an impact on a managers' motivation for engaging in CSR. They found evidence in favor of the conflict-resolution view, which is motivated by maximizing shareholder wealth. When shareholder protection is low, a manager will have more access and incentives to extract private benefits through engaging in CSR. Thus, the impact of CSR on the value of cash holdings will be mitigated when shareholder protection is low. They found that the impact of CSR on excess cash holdings did not hold when shareholder protection was low, supporting this hypothesis.

2.4 ESG and firm value

The concept of ESG came to prominence during the early 2000s. Especially when UNEP FI in collaboration with leading financial institutions published the report "Who Cares Wins" (Initiative (2004)). The report explained the concept of ESG factors in the context of financial markets, and outlined the role of financial institutions in incorporating ESG considerations into their strategies. The report led to the concept being recognized, and other researchers started studying the relationship between ESG and performance, such as Cherkasova, Fedorova, and Stepnov (2023) in their recent research. They examined the relationship between CSR investments and firm value in

the market. In this study, the researchers used a sample of 951 innovative industries firms listed in Asia, North America, and Europe between 2011 and 2019. They found that CSR score were significant in terms of excess stock return on the regional level, but not on the global scale. ESG ratings were priced negatively by European and North American markets, while they were priced positive in the Asian market, due to differences in external factors. In the Asian market, the dominant factors were customer demand, brand and reputation, while these factors were not dominant in the other two markets. Cherkasova et al. (2023) is just one of the many recent studies on the impact of ESG/CSR on firms' performance. Researchers have studied this relationship relentlessly yielding different results. Barnett and Salomon (2012) found a U-shaped relationship between ESG and firm performance. Early in the process the costs of improving ESG are larger than the benefits. The benefits is reaped at a later stage. Hence, the impact from ESG on performance materializes when ESG is at a certain level. The divergence in results also face underlying analytical difficulties as there are divergences between the different rating agencies (Erhart (2022); Berg et al. (2022)). Quantifying certain ESG factors may also be a subjective matter subject to raters' personal views.

2.4.1 The role of ESG during financial crises

In the early days of the Covid-19 pandemic, ESG performance was hyped as a downside risk protection (Demers et al. (2021)). The assumption is that corporate social responsibility builds trust between the company and it's stakeholders. They will stay loyal and help the company overcome challenges such as a market downturn (Demers et al. (2021)).

Lins, Servaes, and Tamayo (2017) uses the term social capital as a factor behind firms' resilience during the financial crisis of 2007/2008. They argued that when the general trust in firms is low, firms with high social capital may

be traded at a premium compared to firms with low social capital. They found that firms who entered the financial crisis with high social capital (measured by CSR scores) had a better performance during the crisis. Ramesh and Athira (2023) used the same terminology and found a positive link between trust and firm performance during the Covid-19 pandemic. Yadav and Srivastava (2023) also finds a positive impact from CSR on firm performance during the covid-19 crisis. They highlight the importance of perceived legitimacy during a time with high information asymmetry and institutional uncertainty.

On the contrary, Demers, Henikse, Joos, and Lev (2021) argues that traditional accounting based measures and intangible assets, including another large set of controls explains the resilience of stock returns during the covid-19 crisis. They found no support for ESG performance on stock returns.There is research suggesting that CSR has an indirect effect on firm performance through the mediating effect of firm's intangible assets (El Khoury et al. (2022)).

Both Demers et al. (2021) and Lins et al. (2017) find that cash holdings is an important factor in firm resilience during financial crises. There is also empirics that shows the direct relationship between ESG performance and levels of cash holdings. Atif and Nadarajah (2022) and Liu, Johl, and Lasantha (2023) found a generally negative link between cash holdings and ESG. They argue that a higher ESG performance lowers agency problems associated with cash holdings, and in turn lowers the levels of cash. Said differently, ESG contributes to an optimal management of cash resources. If we follow this evidence, we belive that the optimal management of cash resources also includes the precautionary retention of cash as a buffer against events such as the covid-19 crisis. In line with this, El Khoury et al. (2022) employs an interaction-variable between high cash levels and ESG ratings in their research on firm resiliency during the

pandemic. They found that firms with greater cash holdings have a stronger effect from ESG on return on assets during the Covid-19 crisis. In a similar vein, Cardillo, Bendinelli, and Torluccio (2023) used a high-ESG and cash ratio interaction variable to highlight that both cash and ESG is important factors when dealing with market meltdown. The role of cash holdings during the Covid-19 crisis is also influenced by firm's usage of debt financing. Acharya and Steffen (2020) found that firms drew down their bank credit lines to increase their cash levels when the market crashed.

3 Hypothesis development

3.1 ESG and the marginal value of cash holdings

Our methodology is divided into 3 different specifications. First, we estimate a target cash holding. This is a firm-specific model that predicts the optimal level of cash using different proxies that aims to capture circumstances that determine the level of cash. The model uses the motives of cash holdings that John Maynard Keynes identified in 1936 as a backdrop (Keynes (1936)). These are the transaction cost motive, the precautionary motive and the speculative motive. The transaction cost motive is based on the day-to-day business activities and the ability to finance these. The speculative motive is based on a firm's access to financing, the ability to finance growth and investments internally when external financing is costly or hard to obtain. The precautionary motive means retaining cash for rainy days, such as when the industry as a whole or the firm itself has had a period of cash flow volatility.

The literature suggests that there is an optimal level of cash holdings where the marginal benefits of having additional cash is equal to its marginal costs (Oler and Picconi (2014)). The costs associated with holding cash is a lower rate of return because of a liquidity premium (Keynes (1936)). There are also possible tax disadvantages, and the higher risk of agency problems and sub-optimal investments (Oler and Picconi (2014)).

After we have estimated the coefficients of the model, we multiply these coefficients with the actual reported results by the firms to obtain our target. To obtain abnormal levels of cash, we subtract the target cash holdings from the reported holdings and group them into excess cash and insufficient cash holdings, where these abnormal cash holdings are positive and negative respectively.

After obtaining our measures of abnormal cash holdings, we further wish to investigate how the market values these. More specifically, we want to examine how investors expect excess cash holdings to be used in an ESG context. In the literature review we saw there were two main views, the agency motive and the conflict-resolution view (Arouri and Pijourlet (2017)). Under the conflict-resolution view, management uses CSR to resolve conflicts with shareholders. Here we should expect that excess cash holdings will be valued higher than under the agency view, when ESG performance is high. When controlling for the interaction between excess cash holdings and CSR, Arouri and Pijourlet (2017) found that these cash holdings were valued higher when CSR performance was high. Our first hypothesis is based on these findings;

Hypothesis 1: When ESG performance is high, the US stock market place a premium on excess cash.

The results of Arouri and Pijourlet (2017) indicated that this effect only took place under high levels of shareholder protection. Thus, if the first hypothesis holds, we can assume that our sample of firms operate in an environment of high shareholder protection. A priori we know from the literature that country-level shareholder protection is considered high in the US, such as when firms cross-list on US stock exchanges to signal commitment to shareholders (Reese and Weisbach (2002)). If we also take the results of Arouri and Pijourlet (2017) into account, we know that country-level variations in shareholder protection determine the effect ESG has on the marginal value of excess cash holdings. As Houston, Lin, and Xie (2018) found, shareholder-protection also varies domestically in the US. The ESG analytics industry also measures how the specific firms cater to their shareholders. Practices such as anti-takeover provisions are firm-specific factors that can influence a firm's treatment of its shareholders. In this regard, we believe that firm-specific differences in shareholder protection can weaken this effect and render the interaction between

ESG performance and cash as insignificant when firms don't take care of their shareholders. When sub-sampling our data into low and high firm-specific shareholder protection, we have the following second hypothesis;

Hypothesis 2: When firms' protection of shareholders are low, there are no effect from ESG performance on the market value of cash holdings.

Hypothesis 2 tests whether firm-specific variations in shareholder protection or shareholder treatment will have an impact on how ESG performance affects the marginal value of cash holdings. Said differently, the impact of ESG performance may only have a positive impact on cash holdings in environments where shareholders are protected from expropriation by management.

For listed firms in the US, cash holdings are valued higher in contrast to other countries because of disclosure requirements and informal monitoring pressure (Fresard and Salva (2010)). These factors have a limiting effect on the access managers have to spend cash resources for personal gain, possibly amplifying any signs of agency problems. Earlier research have shown that abnormal cash holdings are associated with a higher cost of equity (Choi et al. (2018)). In this context, excess cash holdings should be associated with a negative effect on firm value after controlling for ESG performance. After controlling for this factor and other controls such as precautionary cash retention, our hypothesis is that excess cash holdings will be devalued by the market. When reasons considered by shareholders to be valid for keeping cash is controlled for, there may be an information asymmetry that manifests itself in a discounted value of excess cash. This hypothesis is consistent with the findings of Drobetz, Gruninger, and Hirschvogl (2010) that found a devaluation of excess cash holdings in areas where information asymmetry is higher. In effect, this reaction can serve as an indication of investors classifying the excess cash as subject to misuse or

idle investment opportunities. This discussion is the foundation of our third hypothesis;

Hypothesis 3: When ESG performance is low, excess cash holdings is devalued by investors and information asymmetry is higher.

We construct our second model to test hypothesis 1, 2 and 3 in the same manner as the model Fama and French (1998) developed, and Arouri & Pijourlet (2017) has adopted. This model has been used in different ways such as measuring the marginal value of cash in different contexts. Fama and French (1998) used the model to find a relationship between dividends, debt, and firm value. We adopt the model specification by Arouri & Pijourlet (2017) to investigate in an ESG context. As this model also measures the impact of ESG performance on firm value, we further want to investigate what effect ESG alone have on our dependent variable. Arourji & Pijourlet (2017) did their research six years ago and did not find a significant effect from their CSR variable isolated. We use different ESG data in our model and wish to examine whether the ESG variable could yield better explanatory power. As new research on the effect of ESG performance on firm value or returns emerges, we see that there are regional differences in how markets value ESG performance. Cherkasova et al. (2023) found that ESG performance was priced negatively by European and North American markets.Considering this research and the fact that our sample contains only US firms, we have our fourth hypothesis;

Hypothesis 4: ESG performance have a negative impact on firm value in US firms.

3.2 The role of ESG and cash holdings during crisis periods

In the literature review, we saw researchers that found a positive relationship between ESG and firm performance during the financial crisis and the Covid-

19 pandemic. During financial distress the role of ESG is different. Lins et al. (2017) and El Khoury, Nasrallah, Harb, and Hussainey (2022) found that firms with higher CSR or ESG had a better performance during crisis periods. We lean on their results and formulate our fifth hypothesis;

Hypothesis 5: ESG performance have a positive impact on firm value in US firms during the Covid-19 pandemic.

We test this hypothesis in a bid to highlight the difference in investor orientation in crisis-times versus normal times. In hypothesis 1 we are testing how ESG performance are impacting the marginal value of cash holdings. In the context of market crises, the interaction between ESG and cash holdings is viewed differently. Investing in ESG is costly. These investments may be cut when firms have liquidity problems to ensure they can finance operations. If firms have higher levels of cash before the start of the Covid-19 crisis, they are able to invest in ESG and in turn gain the performance benefits from high ESG performance. The sixth hypothesis is therefore;

Hypothesis 6: ESG have a stronger effect on firm performance during the Covid-19 pandemic when firms have large cash holdings.

4 Methodology

4.1 Data

We have collected firm data on 1,505 firms from the S&P 1500 index. We have collected accounting data from Compustat and CRSP via WRDS. Financial ratios, ESG scores, and other CSR data have been extracted from the Asset4/Refinitiv database. Refinitiv is one of the largest providers of ESG data, with more than 15,000 global companies, across 76 countries (Refinitiv (w.y.)). They are also one of the most preferred ESG data and ratings providers, along with Sustainalytics, ISS-ESG and Vigeo Eiris (Brady and Hirai (2021)). US corporate tax rates are obtained from The Tax Foundation (Tax (2021)).

We have collected the overall ESG score which is a weighted sum of the three pillars Environmental, Social and Governance (ESG). The environmental pillar measures the companies' contributions to the environment through disclosures of practices to reduce climate risk and resource use. The social pillar rates how the company treats its customers, employees and focus on human rights. Community involvement and product responsibility is also measured in the social pillar. The governance pillar is divided into ratings of best practice amongst management, shareholders, and CSR strategy.
To isolate certain ESG effects, we have gathered more detailed metrics as well, such as the isolated ratings of shareholders score, management and CSR strategy. Some data are collected from 1986 until 2022. We want to examine the years between 2006 and 2022, and some measures in our models require us to calculate standard deviations of cash flows 20 years back in time.

As a proxy for firm-specific shareholder protection, we have collected data from Refinitiv, using the "Shareholders Score" data item. It measures the treatment of shareholders and use of anti-takeover devices. The treatment of shareholders

are measured by how effective the company are towards equal treatment of all their shareholders.

For our market model, we have gathered Fama-French three factors and the momentum factor from Kenneth French's website (French (2023)) as well as returns data from BetaSuite via WRDS.

4.2 Model 1: Estimating abnormal cash holdings

For our estimate of abnormal cash holdings, we follow Choi, Kim, and Pae (2018) and Oler and Picconi (2014) to estimate a proxy for the optimal level of cash and multiply the coefficients with actual reporting to obtain a target cash holding. We specify the following panel regression model:

$$\begin{aligned}\text{Cash}_{it} = \beta_0 &+ \beta_1 \text{CF\_ from\_- operations}_{it} + \beta_2 \text{Foreign\_Tax}_{it} \\ &+ \beta_3 \text{Age}_{it} + \beta_4 \text{CAPEX}_{it} + \beta_5 \text{R\&D}_{it} + \beta_6 \text{Sal}_{\text{es\_}} \text{Growth}_{it} \\ &+ \beta_7 \text{Working\_ Capital}_{it} + \beta_8 \text{Firm\_ Size}_{it} + \beta_9 \text{Industry\_ Sigma}_{it} \\ &+ \beta_{10} \text{Dividend\_ Dummy}_{it} + \text{Year Fixed Effects} \\ &+ \text{Industry Fixed Effects} + \epsilon_{it}\end{aligned}$$

Model 1: *Panel OLS regression for estimation of firm-specific target cash levels.*

The measure of cash is cash and short-term investments scaled by total assets less cash and short-term investments. Cash flow from operations is the net cash flow from operating activities with the same scaling as the dependent variable. This variable acts as a proxy for the firm's need for cash. A higher operational cash flow gives easier access to cash, and in turn lowers the need for accumulating cash reserves. We therefore expect a negative relationship between this variable and the level of cash holdings. The foreign tax variable follows Fritz Foley, Hartzell, Titman, and Twite (2007). They found that multinational corporations hold more cash because of the

potential tax costs of repatriating foreign income. They therefore leave cash at their foreign subsidiaries to avoid incurring repatriation taxes by relocating cash to the US. We measure this by multiplying the foreign pre-tax income by the US statutory corporate tax rate the given year, less foreign income taxes. The variable is scaled by total assets less cash. We expect this variable to have a positive effect on the level of cash holdings.

We further expect firm's cash holdings to decline with size and age. We use these variables as proxies for a firm's access to capital markets, which lowers the need for accumulating cash. Firm age is measured by the natural logarithm of the difference between the observational year and the firms' listing date. Firm size is the natural logarithm of total assets. Research and development expenses (R&D), sales growth, and capital expenditures (capex), are also proxies for firm's need for cash. All three variables represent a company's financing of growth. We expect R&D and sales growth to have a positive effect on cash. Initially we also expect capex to have a positive effect, although the literature has yielded differing results on the effect of capex. Bates, Kahle, and Stulz (2009) finds a negative relationship, while Oler & Picconi (2014) find a positive relationship. R&D is research and development expense scaled by total assets.

To avoid our model getting dominated by small firms with intensive R&D, we scale by total assets alone while also setting missing observations to zero to avoid loss of observations (Oler and Picconi (2014)). Sales growth is defined as the percentage of sales growth between time t-1 and time t. The capex variable is capital expenditures scaled by total assets less cash. Net working capital, net of cash is also added. Non-cash working capital acts as an easy access to capital which lowers the need for cash holdings. We scale by total assets less cash. Industry sigma is the standard deviation of the industry cash flows for the previous 20 years. We use the 2-digit SIC (Standard Industry

Classification Code) to group the cash flows by industry. The cash flows are calculated by subtracting interest expenses, taxes and dividends from operating income before depreciation. The variable is scaled by total assets less cash. The rationale behind using this variable is that a higher industry cash flow volatility should increase the need for precautionary cash holdings.

We have added a dividend dummy, which takes on the value of one if the firm has distributed dividends and zero if not. Finally, we have added industry-fixed and year-fixed effects as dummy variables. The industry-fixed effects are measured by the 2-digit SIC codes.

Table 1: Summary statistics model 1

Variable	N	Mean	Sd	25th	Median	75th
Cash holdings	40,391	0.506	21.820	0.023	0.07	0.209
CAPEX	37,092	0.022	0.046	0.000	0.000	0.017
CF from operations	38,217	0.093	0.199	0.047	0.093	0.157
Foreign tax	48,460	0.001	0.007	0.000	0.000	0.000
Firm age (not log)	48,194	18.540	18.359	6.000	15.000	27.000
R&D	48,460	0.020	0.511	0.000	0.000	0.123
Sales growth	32,424	0.125	0.208	0.008	0.085	0.195
Working capital	31,673	0.055	0.215	-0.039	0.051	0.177
Firm size	47,820	7.880	2.058	6.553	7.902	9.209
Industry sigma	29,909	0.255	0.842	0.049	0.083	0.164
Dividend dummy	48,460	0.657	0.475	0.000	1.000	1.000

Table 1: Summary statistics of variables used to estimate the optimal level of cash. All continuous independent variables are winsorized at the 1% and 99% level, by year.

We first run the model on the entire sample period from 1986 to the end of 2022 to get a sense of the long-term behavior and to see if there are significant differences in the effect of the independent variables on cash holdings when comparing to the main period from 2006 to the end of 2022. We cluster robust standard errors by firm to address cross-sectional correlation and bias in our

estimation of standard errors and t-statistics. As our main period of interest is only 17 years, we control for time-fixed effects parametrically using dummies for years. The estimation of standard errors follows Petersen (2009).

Table 2: Target cash OLS panel regressions

	Cash holdings	
	Entire Sample	2006-2022
Capex	-1.224***	-1.325***
	(-14.397)	(-11.067)
Cash flow from operations	-0.984***	-0.914***
	(-5.547)	(-3.560)
Foreign tax	6.520***	6.776***
	(8.316)	(6.401)
Age	-0.036***	-0.043***
	(-4.994)	(-4.748)
R&D	4.428***	3.928***
	(21.652)	(12.611)
Sales growth	0.190***	0.151
	(3.034)	(1.555)
Working capital	-1.376***	-2.037***
	(-11.288)	(-9.320)
Firm size	-0.105***	-0.132***
	(-14.210)	(-11.275)
Industry sigma	0.038**	0.092*
	(2.490)	(1.888)
Dividend_dummy	0.013	0.030*
	(1.095)	(1.929)
Constant	1.006***	1.583***
	(10.525)	(10.492)
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
Observations	23,823	14,855
Adjusted R^2	0.287	0.324

Table 2: Regression of firm characteristics on cash holdings between the years 1986 and 2022. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level.

We see that the results suggest that capex, cash flow from operations, age, amount of working capital and firm size decreases the level of cash holdings. Age and firm size acts as proxies for a firm's access to capital markets and thus lowers the need for holding cash. The three proxies for financing of growth (R&D, sales growth and capex) are mainly positive. The capex variable is significantly negative which contradicts our initial expectation. This variable is sensitive to specifications. The sign of the coefficient changes based on how one constructs their dependent variable (Bates et al. (2009)). Using the natural logarithm of cash holdings yields a positive coefficient, while our model scales the variable by net assets. Bates et al. (2009) find that using the same specification as we do explain the variation in cash holdings better.

The foreign tax variable also has a positive impact on cash levels. As with Bates et al. (2009) we find a positive and insignificant dividend dummy in our model. The industry sigma variable is positive and statistically significant as expected, as it proxies the precautionary motive.

After obtaining our estimate coefficients from the OLS regression in table 2, we estimate a optimal cash level by multiplying all observed variables with the estimated coefficients. We then subtract this estimate from the reported cash holdings to obtain a firm-specific estimate of abnormal cash holdings. We also group the abnormal cash into two more variables, namely excess cash, and insufficient cash. We restrict our data sample between the years 2006 and 2022 because the lack of ESG-related observations in earlier periods. We are left with 15,518 observations of abnormal cash holdings between 1,098 firms, out of 28,286 observations. There are 4,556 occurrences of excess cash holdings and 10,962 of insufficient cash holdings.

Table 3: Summary statistics of estimated abnormal cash holdings

Variable	N	Mean	Sd	25th	Median	75th
Abnormal cash	15,518	-0.176	0.494	-0.367	-0.163	0.042
Insufficient cash	10,962	-0.377	0,446	-0.453	-0.274	-0.141
Excess cash	4,556	0.316	0.435	0.075	0.173	0.380

Table 3: Summary statistics of abnormal cash holdings estimates between the years 2006 and 2022. All variables are winsorized at the 1% and 99% level, by year.

4.3 Model 2: Testing hypothesis 1-4

The baseline specification of model 2 is as follows:

$$\begin{aligned}\text{Value}_{it} = {} & \beta_0 + \beta_1 \text{EBIT}_{it} + \beta_2 \Delta\text{EBIT}_{it} + \beta_3 \Delta\text{EBIT}_{(t+1)} + \beta_4 \Delta\text{Assets}_{it} \\ & + \beta_5 \Delta\text{Assets}_{(t+1)} + \beta_6 \text{R\&D}_{it} + \beta_7 \Delta\text{R\&D}_{it} + \beta_8 \Delta\text{R\&D}_{(t+1)} \\ & + \beta_9 \text{Int}_{it} + \beta_{10} \Delta\text{Int}_{it} + \beta_{11} \Delta\text{Iint}_{(t+1)} + \beta_{12} \text{Div}_{it} \\ & + \beta_{13} \Delta\text{Div}_{it} + \beta_{14} \Delta\text{Div}_{(t+1)} + \beta_{15} \Delta\text{Value}_{(t+1)} + \delta \text{Cash}_{it} \\ & + \beta_{16} \text{ESG}_{it} + \text{YearFixedEffects}_{it} + \text{IndustryFixedEffects}_{it} + \epsilon_{it}\end{aligned}$$

Model 2: *Panel OLS regression testing the impact of ESG and excess cash holdings on firm value.*

$Value_{it}$ is our measure of the market value of the firm. This variable is defined by the market capitalization plus total liabilities. We measure it by multiplying the closing price per share with the number of outstanding shares at the end of each year. We then add total liabilities. $EBIT_{it}$ is the earnings before interest and taxes. $ASSETS_{it}$ is defined as net assets, which are total assets less cash and short-term investments. $R\&D_{it}$ is research and development expenses, while INT_{it} is the period's total interest expense. DIV_{it} are dividends distributed. $Cash_{it}$ is our estimate of abnormal cash holdings as described above. All financial and accounting data is scaled by net assets. Δ_{it} indicates the 1-year change in the variable from year t-1. $\Delta_{(t+1)}$ indicates the change in

a variable one year ahead.

We add these lead variables to control for investor's expectations of future growth, since an increase in cash holdings may change these expectations as well (Pinkowitz et al. (2006)). ESG_{it} is the natural logarithm of the Asset4/Refinitiv total ESG score. The Refinitiv ESG score is considered as one of the most reliable ESG scores (El Khoury et al. (2022)). Arouri & Pijourlet (2017) uses the MSCI ESG research score in their research and converts these to numerical discrete variables between 1 and 7. The Asset4/Refinitiv ESG score is numeric and ranges from 0 to 100. After excluding all financial firms due to strict cash holdings legislation (see Bates et al. (2009), Arouri & Pijourlet, (2017) and Drobetz et al. (2010)), we are left with 4,900 observations of firms with abnormal cash holdings, 1,433 observations of firms with excess cash holdings and 3,467 where cash holdings are insufficient. The ESG variable in tandem with the abnormal cash variables is the constraint on number of observations. As with model 1, standard errors reflected in t-statistics are robust and clustered by firm.

Table 4: Model 2: Summary statistics

Variable	N	Mean	Sd	25th	Median	75th
Firm value	14,963	2.036	2.709	0.683	1.212	2.189
EBIT	17,554	0.093	0.278	0.057	0.100	0.164
EBIT delta	17,283	0.005	0.122	-0.020	0.001	0.022
EBIT delta forward	16,397	0.005	0.122	-0.020	0.001	0.022
Net assets delta	17,441	0.124	0.301	-0.006	0.058	0.155
Net assets delta forward	16,419	0.137	0.374	-0.014	0.051	0.154
R&D	17,789	0.030	0.059	0.000	0.001	0.032
R&D delta	17,789	-0.032	0.160	-0.005	0.000	0.000
R&D delta forward	17,789	0.024	0.122	0.000	0.000	0.003
I-rates	16,690	0.016	0.018	0.006	0.013	0.021
I-rates delta	16,450	0.000	0.007	-0.002	0.000	0.001
I-rates delta forward	15,589	0.000	0.007	-0.002	0.000	0.001
Dividends	17,789	0.019	0.034	0.000	0.007	0.024
Dividends delta	17,789	-0.001	0.006	-0.001	0.000	0.000
Dividends delta forward	17,789	0.000	0.020	0.000	0.000	0.001
Firm value delta forward	13,587	-0.026	1.300	-0.237	0.017	0.263
ESG	6,034	3.799	0.482	3.500	3.879	4.187
Environmental pillar	5,283	3.534	0.945	3.175	3.835	4.214
Social pillar	6,034	3.796	0.533	3.453	3.886	4.228
Governance pillar	6,033	3.938	0.507	3.708	4.072	4.304
Shareholder score	11,697	3.815	0.791	3.495	4.062	4.379
ESG net of SH score	5,208	3.853	0.454	3.574	3.946	4.219

Table 4: Summary statistics of variables in firm valuation models between the years 2006 and 2022. All variables except ESG measures are winsorized at the 1% and 99% level, by year.

Table 4 shows the summary statistics for all variables used in model 2 regressions. *Shareholder score* is our measure of shareholder protection. We scale by using the natural logarithm.

The appendix contains the correlation matrix of the variables we use in model 2. There is a positive correlation between excess cash and firm value (0.392).

We also observe relatively small correlations between independent variables, with a few exceptions. This gives us grounds to assume that our multivariate model will not suffer from collinearity (see Arouri & Pijourlet, (2017) and Pinkowitz et al. (2006)). A variable of concern is the shareholder score which is relatively correlated (0.22) with our ESG variable. If we subsample the shareholder score into high and low levels we risk indirectly also subsampling the ESG score, biasing our results when testing hypothesis 2. The governance pillar has a 26% weight in the overall ESG rating. The Governance pillar is further divided into a weighted sum of three sub-scores. These are the shareholder score (20%), the CSR strategy score (13%) and the management score (67%). We re-calculate the governance pillar without the shareholder score such that it only contains the management and CSR strategy components. We assign new weights by distributing the weight of the shareholder score amongst the other two by the relative weights between them.

$$\frac{\text{CSR strategy (13\%)}}{\text{Management (67\%)}} = 19.4\%$$

New CSR strategy weigh = 13% + 20% x 19.4% = 16.88%

New Management weigh = 67% + 20% x (1-19.4%) = 83.12%

The new governance pillar is added to the environmental- and social pillar with its original weight in the overall ESG score to create a new ESG score net of shareholder score. The overall ESG score is 25% governance, 31% social and 44% environmental. The new ESG variable now has a lower correlation with the shareholder score, with 0.15.

4.3.1 Model 2: The marginal value of cash holdings

We start by running the model on the three different cash estimates from model 1. We do this to observe how the cash variables affect firm value unconditionally.

Table 5: Firm value on abnormal cash variables

	Independent variable: Firm value		
	1	2	3
Abnormal cash	0.510***		
	(4.549)		
Excess cash		1.660***	
		(5.442)	
Insufficient cash			-0.042***
			(-6.585)
EBIT	3.452***	4.447***	2.923***
	(7.467)	(6.045)	(6.228)
EBIT delta	0.415	-0.311	0.642
	(0.783)	(-0.318)	(1.301)
EBIT delta forward	3.814***	4.621***	3.157***
	(7.055)	(4.929)	(5.390)
Net assets delta	0.727***	0.745***	0.675***
	(5.720)	(3.281)	(5.038)
Net assets delta forward	0.951***	0.784***	0.865***
	(8.746)	(4.082)	(7.273)
R&D	15.119***	22.153***	12.444***
	(13.103)	(4.997)	(12.648)
R&D delta	-3.559***	-1.670	-3.715***
	(-5.178)	(-0.709)	(-6.069)
R&D delta forward	7.666***	7.348***	6.637***
	(8.000)	(3.925)	(6.359)

Table 5: Firm value on abnormal cash variables continued

	Independent variable: Firm value		
	1	2	3
I-rates	10.195***	3.582	9.733***
	(3.897)	(0.758)	(3.170)
I-rates delta	-5.420	-13.746	-6.154
	(-1.035)	(-1.227)	(-1.143)
I-rates delta forward	-4.988	-19.875	-1.235
	(-0.806)	(-1.501)	(-0.195)
Dividends	12.872***	11.925***	12.300***
	(11.337)	(6.270)	(9.100)
Dividends delta	1.429	2.961	3.172
	(0.236)	(0.307)	(0.408)
Dividends delta forward	9.659***	7.108***	10.357***
	(6.160)	(3.619)	(4.743)
Firm value forward	-0.547***	-0.624***	-0.457***
	(-9.084)	(-6.670)	(-6.030)
Constant	-0.093	-0.252	-0.112
	(-0.663)	(-0.499)	(-0.900)
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	11,773	3,178	8,595
Adjusted R^2	0.540	0.624	0.498

Table 5: Regression of firm value on abnormal cash holdings between the years 2006 and 2022. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level.

The model suggests that, on average, investors value having excess cash. We have taken the absolute value of insufficient cash holdings for ease of interpretation and see that having insufficient cash levels are negatively impacting firm value. We further wish to investigate the effect of ESG on firm value and run the same model on our ESG measure. We run it with and without the estimated abnormal cash levels.

Table 6: Firm value on abnormal cash variables and ESG

	Independent variable: Firm value			
	1	2	3	4
ESG	-0.168***	-0.154***	-0.263***	-0.059*
	(-5.230)	(-5.043)	(-4.173)	(-1.778)
Abnormal cash		0.047		
		(0.408)		
Excess cash			0.757*	
			(1.859)	
Insufficient cash				0.165*
				(1.658)
Constant	0.485***	0.347**	1.016***	-0.106
	(3.082)	(2.036)	(3.304)	(-0.678)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Observations	5,637	4,900	1,433	3,467
Adjusted R^2	0.571	0.593	0.689	0.586

Table 6: Regression of firm value on ESG and abnormal cash holdings between the years 2006 and 2022. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level. For brevity we have excluded control variables from the table.

The ESG variable is negative and statistically significant across all specifications. This contrasts with Arouri & Pijourlet (2017) who reports a statistically insignificant relationship in their starting model. We have seen other researchers also reporting insignificant results using the MSCI ratings, and significant results from the Refinitiv ratings (Panella et al. (2021)). The insufficient cash variable has a positive impact on firm value when introducing the ESG variable. As lower cash holdings is associated with lower agency problems, we initially interpret the positive coefficient as firms having invested these resources to create value.

To further test the relationship between having abnormal cash and ESG performance, we add an interaction term between these two variables.

Table 7: Interaction between ESG and abnormal cash holdings

	Independent variable: Firm value		
	1	2	3
ESG	-0.076**	-0.430***	0.126**
	(-2.283)	(-6.325)	(2.040)
Abnormal cash	-2.269***		
	(-6.271)		
Excess cash		-3.289***	
		(-6.000)	
Insufficient cash			2.867***
			(3.217)
Cash*ESG	0.588***	0.894***	-0.716***
	(6.451)	(7.839)	(-3.093)
EBIT	9.414***	10.064***	9.317***
	(18.961)	(12.101)	(16.815)
EBIT delta	-2.428***	-3.568***	-1.838***
	(-5.246)	(-3.458)	(-4.194)
EBIT delta forward	3.622***	3.399***	3.729***
	(8.606)	(4.466)	(9.362)
Net assets delta	0.120	0.102	0.137
	(1.325)	(0.830)	(1.320)
Net assets delta forward	0.445***	0.318**	0.489***
	(4.626)	(2.217)	(4.372)
R&D	6.556***	-2.111	6.638***
	(3.887)	(-0.464)	(4.105)
R&D delta	-18.774**	-22.436	-18.977**
	(-2.280)	(-1.450)	(-1.976)
R&D delta forward	30.708***	27.016**	29.671***
	(3.374)	(1.961)	(2.693)

Table 7: Interaction between ESG and abnormal cash holdings continued

	Independent variable: Firm value		
	1	2	3
I-rates	-0.130	10.916**	-7.809***
	(-0.046)	(2.521)	(-3.855)
I-rates delta	6.240	-0.606	10.145*
	(1.221)	(-0.083)	(1.680)
I-rates delta forward	0.474	9.168	-3.412
	(0.087)	(0.925)	(-0.723)
Dividends	6.468***	12.293***	3.453**
	(5.264)	(6.093)	(2.192)
Dividends delta	6.039	14.258*	4.103
	(1.131)	(1.910)	(0.638)
Dividends delta forward	4.096***	8.087***	0.201
	(2.904)	(3.632)	(0.108)
Firm value forward	-0.350***	-0.514***	-0.223*
	(-3.328)	(-3.975)	(-1.773)
Constant	-0.030	1.411***	-0.838***
	(-0.180)	(4.881)	(-3.272)
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	4,900	1,433	3,467
Adjusted R^2	0.606	0.712	0.589

Table 7: Regression of firm value on ESG, abnormal cash holdings, and their interaction, between the years 1986 and 2022. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level.

As with Arouri & Pijourlet (2017) we see that the interaction term on excess cash is positive and statistically significant. This suggests that investors value excess cash higher for firms with high ESG performance. The assumption is that investors believe the excess cash holdings will be used to enhance shareholder value through good management practice such as holding liquid assets for unforeseen events or potential investments when ESG performance is high. This is consistent with the conflict-resolution view.

After we have added the interaction term, we see that the excess cash variable is negative. Our hypothesis is that when controlling for other factors, such as the beforementioned interaction between ESG and excess cash, information asymmetry may be a cause for investors to discount the value of these cash holdings. Risks of agency problems and idle investments will have a negative impact when cash holdings increase. We use the absolute value of the annual average bid-ask spreads as a proxy for information asymmetry. We expect that the bid-ask spreads will be higher in firms with excess cash holdings and low ESG performance. In fact, the bid-ask spread is 4 times larger in the fourth quartile of excess cash holdings compared to the third quartile.

Table 8: Average bid-ask spreads, different quartiles

Quartile	Excess cash	Absolute value of annual bid-ask spreads
1	0.075	0.018
2	0.173	0.119
3	0.380	0.266
4	4.480	1.073

Table 8: Average annual bid-ask spreads for different quartiles of excess cash holdings.

While not a perfect proxy for information asymmetry, we believe that a higher bid-ask spread can give us a sense of the different levels of information investors have. Bid-ask spreads has previously been used by professional researchers as a proxy for information asymmetry (Chowdhury et al. (2016)).

Finally, we observe that the ESG coefficient and the interaction coefficient behaves differently when firms have insufficient cash holdings. If we follow the same reasoning as with excess cash, the information asymmetry is lower for these firms when insufficient cash holdings increase (lower levels of cash). The positive impact from lower levels of cash may imply that these firms are efficient in investing their resources to grow and create value. The interaction term suggests that having high ESG combined with significantly insufficient cash holdings is negative on firm value. Having insufficient cash or financial constraints while maintaining a high ESG performance might be associated with negative firm value. The potential benefits of having a high ESG performance may not be fully realized, and ESG investments may be viewed as a negative as the firm cannot afford these investments.

We also see that the intercept is negative and statistically significant which indicates that this sample may consist of some financially distressed firms. The ESG performance of these firms may be an immunizing market factor. Said differently, firms with high ESG performance are more trusted by investors to safely navigate the firm through periods of low liquidity or financial distress. On the other hand, the negative intercept may also imply that the firms in this sample have a generally lower market capitalization, and thus are dominated by younger and smaller firms that don't have as much cash. There are also other signs such as the change in behavior of certain control variables such as the interest payments. Firms with lower cash may be more reliant on debt financing.

4.3.2 Model 2: Testing levels of shareholder protection

Following the results from hypothesis 1, we further test whether differences in shareholder protection will have an impact on the interaction between excess cash holdings and ESG. We subset our data into below- and above median shareholder score, using the ESG score net of shareholder score. This helps us test whether ESG performance still have an impact on the interaction term even when shareholders are less protected against expropriation. As with Arouri & Pijourlet (2017) we focus on firms with excess cash holdings. We first run the model on the different ESG pillars and the new overall ESG measure.

Table 9: Interaction between ESG and abnormal cash holdings for alternative measures of ESG

	Independent variable: Firm value			
	Env	Soc	Gov	ESG net
ESG	-0.223***	-0.318***	-0.406***	-0.523***
	(-6.230)	(-5.709)	(-5.751)	(-8.139)
Excess cash	-1.698***	-3.420***	-3.684***	-3.027***
	(-3.088)	(-6.216)	(-6.398)	(-5.819)
ESG*Cash	0.621***	0.919***	0.967***	0.865***
	(4.812)	(8.035)	(8.245)	(8.543)
Constant	0.327	1.159***	1.031***	1.273***
	(1.581)	(4.285)	(3.802)	(4.962)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Observations	1,259	1,433	1,433	1,258
Adjusted R^2	0.743	0.710	0.713	0.755

Table 9: Regression of firm value on ESG, excess cash holdings, and their interaction, between the years 2006 and 2022. The different measures of ESG is Environmental (Env), Social (Soc), Governance (Gov), and ESG net of shareholder score (ESG net). For brevity we have excluded control variables from the table. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level.

We see that there is not much difference between the specifications in regard to explanatory power or the coefficients. We do observe that the social and governance pillars have a larger effect on firm value than the environmental pillar.

Table 10: ESG and excess cash under different levels of shareholder protection

	ESG		*ESG net*	
	High	Low	High	Low
ESG	-0.407***	-0.309**	-0.424***	-0.349***
	(-4.264)	(-2.469)	(-4.533)	(-2.803)
Excess cash	-3.768***	-0.560	-3.676***	0.334
	(-5.183)	(-0.252)	(-5.383)	(0.133)
ESG*Cash	0.993***	0.166	0.952***	-0.037
	(7.415)	(0.290)	(8.043)	(-0.058)
Constant	1.669**	0.909*	1.352**	0.865*
	(2.498)	(1.923)	(2.303)	(1.848)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Observations	724	706	662	593
Adjusted R^2	0.761	0.735	0.792	0.774

Table 10: Regression of firm value on ESG, excess cash holdings, and their interaction under different levels of shareholder protection, between the years 2006 and 2022. ESG is the ESG score and ESG net is the ESG score without the shareholder component. For brevity we have excluded control variables from the table. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level.

We see that the interaction between excess cash holdings and ESG no longer holds when shareholders are in risk of being expropriated. As Arouri & Pijourlet (2017), Pinkowitz et al (2006) and Kalcheva and Lins (2007) find, shareholder protection has an impact on the value of cash holdings as well as the interaction between cash holdings and ESG performance. The underlying assumption is that when shareholder protection is high, managers are less likely to extract private, value-destroying benefits from cash holdings.

4.4 Model 3: Testing hypothesis 5 and 6 - ESG and cash holdings in crisis periods

We construct the third model to test whether the relationship between ESG and cash holdings influences firms' market performance during the crash in the first quarter of 2020. We again use model 1 to estimate a target cash level. We run model 1 again from 2013 until the end of 2019. As Choi et al. (2018) we narrow the time window on this estimation to get coefficients estimated with financial data closer to our year of interest. We multiply the coefficients with reported firm data and obtain a target cash holding at the end of 2019. We create the excess cash and insufficient cash holdings variables once more by subtracting the target cash holdings from reported holdings. We use the absolute value of insufficient cash. At the end of 2019 we have 260 firms with excess cash holdings and 552 firms with insufficient cash holdings. Further we re-create the same baseline model as Lins et al. (2017) constructed to test the impact of CSR during the financial crisis in 2007/2008. We use the following baseline model;

$$\begin{aligned}\text{Returns}_{(i,2020)} = \beta_0 &+ \beta_1 \text{ESG}_{(i,2019)} + \beta_2 \text{size}_{(i,2019)} + \beta_3 \text{LT\_debt}_{(i,2019)} \\ &+ \beta_4 \text{ST\_debt}_{(i,2019)} + \beta_5 \text{cash\_holdings}_{(i,2019)} + \beta_6 \text{profitability}_{(i,2019)} \\ &+ \beta_7 \text{BTM}_{(i,2019)} + \beta_8 \text{momentum}_{(i,2019)} + \text{Idiosyncratic\_risk}_i \\ &+ \text{IndustryFixedEffects}_i + \text{Fama\_French\_loadings}_i + \epsilon_{it}\end{aligned}$$

Model 3: *Cross-sectional OLS regression testing the impact of ESG on stock returns during the covid-19 crisis*

The baseline model contains cash holdings as reported by the firms, scaled by total assets on the balance sheet. We start off with this cash measure to look at the ESG variable isolated in the same way as Lins et al. (2017) to see how it affects returns during the covid-19 crisis (Lins et al. (2017)). We have two different measures of stock returns, namely raw buy-and-hold returns and abnormal buy-and-hold returns over the first quarter of 2020. The abnormal buy-and-hold returns are computed using the Fama-French 3-factor model including the momentum factor (Carhart (1997); Fama and French (1993)

The factors are computed using monthly data in a five-year window leading up to the end of 2019. Factor loadings are added as controls in the model. The model also has the residual variance from the market model (idiosyncratic risk) added as a control. The assumption is that stock market volatility also affect returns (Lins et al. (2017)). We control for firm's financial health right before the crisis materialized. Besides the abovementioned cash holdings variable, we also use long-term debt, short-term debt, and profitability. Profitable firms with low debt and more cash can invest during crisis periods, in contrast to other firms that are forced to cut investments. Especially short-term debt maturing during the crisis can be detrimental (Lins et al. (2017)). Long-term debt is defined as total long-term debt scaled by total assets, and short-term debt is debt in

current liabilities scaled by total assets. Profitability is operating income before depreciation divided by total assets.

To have consistency in model 3, we have re-scaled our excess- and insufficient cash estimates by total assets since these were scaled by assets less cash in model 1. We have also added the book-to-market ratio, size, and momentum at the end of 2019 as controls for other firm characteristics. The book-to-market ratio is the book value of equity divided by the market value of equity, while size is the natural logarithm of the firm's market capitalization (share price multiplied by outstanding shares). There is also a dummy variable indicating whether firms have a negative book-to-market or not. This variable is added since firms with negative book-to-market are likely distressed and their returns may behave more like firms with high book-to-market, rather than firms with low book-to-market (Lins et al. (2017)). We define momentum as the raw buy-and-hold returns over the period from January 2019 until December 2019. All control variables, ESG and the constructed cash variables are measured at the end of 2019, as close to the crisis impact time as we could.

The ESG variable in our model has corporate governance indicators embedded in the measure. Lins et al. (2017) uses corporate governance measures as controls in their model. We do this by running the model on the different E, S and G pillars as well as the overall ESG score, to get a sense of how each of the categories impacts the model similar to (El Khoury et al. (2022)). As Lins et al. (2017) we also remove micro-cap stocks (below $250m) as these firms may have low liquidity and high bid-ask spreads, as well as potentially being more subjected to price pressure effects of trading. All these effects could likely be more pronounced during a market crisis (Lins et al. (2017)). Financial firms

are also removed from the sample as these were removed computing the target cash holdings from model 1. The time of measurement is indicated as time subscripts in the regression equation. In practice we have only one observation per firm, so these subscripts are suppressed. We have 916 observations in the baseline model which is further constrained when introducing the estimated cash variables and ESG measures.

4.4.1 Model 3: Summary statistics

Table 11: Model 3 Summary statistics

Variable	N	Mean	Sd	25th	Median	75th
Raw buy-and-hold returns	936	-0.157	0.232	-0.296	-0.152	-0.027
Abn. buy-and-hold returns	935	0.180	0.307	0.000	0.158	0.343
ESG	950	3.781	0.452	3.496	3.820	4.157
Firm size	957	24.230	6.145	21.420	22.500	24.000
Long-term debt	957	0.301	0.189	0.170	0.302	0.410
Short-term debt	957	0.037	0.055	0.007	0.020	0.046
Cash holdings	957	0.117	0.136	0.021	0.064	0.163
Profitability	957	0.118	0.072	0.076	0.113	0.152
Book-to-market	957	0.463	0.481	0.121	0.360	0.638
Negative BTM dummy	957	0.903	0.296	1.000	1.000	1.000
Momentum	923	0.240	0.256	0.093	0.244	0.399
Idiosyncratic risk	936	0.098	0.041	0.068	0.088	0.116
Momentum loading	935	-0.000	0.013	-0.005	0.000	0.006
SMB loading	936	-0.005	0.007	-0.009	-0.005	-0.001
HML loading	936	-0.020	0.038	-0.043	-0.024	-0.002
rM-rF loading	936	-7.930	6.061	-10.418	-7.934	-5.394
Excess cash	260	0.071	0.181	0.000	0.000	0.013
Insufficient cash abs	552	0.315	0.269	-0.410	0.256	0.124
Enviromental pillar	864	3.508	0.987	3.116	3.809	4.215
Social pillar	947	3.870	0.480	3.534	3.956	4.255
Governance pillar	947	4.009	0.418	3.811	4.114	4.308

Table 11: Summary statistics of variables used in model 3. All variables except returns are measured at the end of 2019. Returns are from the first quarter of 2020. All variables are winsorized at the 1% and 99% level

4.4.2 Model 3: Results

We first run the model as Lins et al. (2017). We test both raw and abnormal buy-and-hold returns on the ESG variable.

Table 12: Stock returns during Q1 2020 of the Covid-19 crisis

	Buy-and-hold returns	
	Raw	Abnormal
ESG	0.043***	0.049***
	(2.730)	(2.949)
Firm size	-0.003	-0.004*
	(-1.321)	(-1.730)
Long-term debt	-0.004	-0.017
	(-0.073)	(-0.321)
Short-term debt	-0.407***	-0.459***
	(-2.781)	(-2.658)
Cash holdings	0.226***	0.234***
	(2.909)	(2.935)
Profitability	0.341**	0.296**
	(2.394)	(2.063)
Book-to-market	0.046	0.052
	(1.108)	(1.230)
Negative book-to-market dummy	0.038	0.038
	(0.901)	(0.914)
Momentum	0.074**	0.059
	(2.027)	(1.543)

Table 12: Stock returns during Q1 2020 of the Covid-19 crisis continued

	Buy-and-hold returns	
	Raw	Abnormal
Idiosyncratic risk	0.613*	0.193
	(1.901)	(0.585)
Momentum loading	0.379	-2.344**
	(0.445)	(-1.997)
SMB loading	2.608*	-6.517***
	(1.790)	(-4.048)
HML loadings	1.513***	-6.474***
	(5.598)	(-23.964)
Rm-Rf loading	0.018***	-0.006**
	(5.952)	(-2.040)
Constant	-0.316***	-0.270***
	(-3.186)	(-2.650)
Industry dummies	Yes	Yes
Observations	916	916
Adjusted R^2	0.287	0.575

Table 12: Regression on stock returns Q1 2020 including the Refinitiv ESG score. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors.

We report similar results as Lins et.al (2017) did during the financial crisis of 2007/2008. The short-term debt is negative and significant both economically and statistically. Profitable firms with higher cash holdings yield significantly higher returns. This is consistent with other research that shows higher cash holdings and lower leverage led to higher performances during the pandemic (see Ramelli and Wagner (2020); El Khoury et al. (2022)). ESG now has a positive impact on returns. We saw in previous results from model 2 that ESG in general has a negative impact on firm value, except when cash holdings were scarce. We interpret this as an indication that ESG performance during financial distress has an immunizing effect on performance. Social capital and trust is more important to investors in this context. We further run the same model on the different E, S and G pillars to observe the behavior of these categories isolated.

Table 13: Stock returns during Q1 2020 of the Covid-19 crisis on different ESG pillars

	Raw buy-and-hold returns		
	Env	Soc	Gov
ESG	0.023***	0.045***	-0.006
	(2.795)	(2.752)	(-0.336)
Cash holdings	0.202***	0.232***	0.211***
	(2.641)	(3.002)	(2.709)
Constant	-0.260***	-0.318***	-0.127
	(-2.878)	(-3.271)	(-1.263)
Industry dummies	Yes	Yes	Yes
Control variables	Yes	Yes	Yes
Observations	837	913	913
Adjusted R^2	0.321	0.289	0.283

	Abnormal buy-and-hold returns		
	Env	Soc	Gov
ESG	0.025***	0.047***	-0.006
	(2.748)	(2.780)	(-0.333)
Cash holdings	0.209***	0.236***	0.214***
	(2.616)	(2.985)	(2.688)
Constant	-0.198**	-0.254**	-0.056
	(-2.171)	(-2.556)	(-0.556)
Industry dummies	Yes	Yes	Yes
Control variables	Yes	Yes	Yes
Observations	837	913	913
Adjusted R^2	0.588	0.580	0.576

Table 13: Stock returns Q1 2020 on different ESG pillars. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors.

The environmental and social pillars have a positive effect on returns in our model. The governance pillar does not have a significant impact. These results are consistent with professional researchers findings, namely that the different categories of ESG impact firm performance differently. Albuquerque et al. (2020) found that stocks with higher levels of environmental and social scores performed better in both volatility and returns during the first quarter of the pandemic. They also show that these results cannot be explained by a governance-effect.

Our next step is to test the relationship between our estimated excess cash holdings and insufficient cash holdings as well as ESG, as we did in model 2. We first add these variables to the model to observe them unconditionally, before introducing the interaction term. We also run the model on different quartiles of ESG.

Table 14: Stock returns during Q1 2020 of the Covid-19 crisis with abnormal cash measures

	Raw		*Abnormal*	
	1	2	3	4
ESG	0.072*	0.009	0.088**	0.008
	(1.801)	(0.307)	(2.042)	(0.288)
Excess cash	0.149*		0.163**	
	(1.963)		(2.076)	
Insufficient cash		0.071*		0.072
		(1.649)		(1.591)
Firm size	-0.015	0.010	-0.020	0.008
	(-0.991)	(0.938)	(-1.249)	(0.697)
Long term-debt	-0.005	-0.022	-0.013	-0.035
	(-0.050)	(-0.344)	(-0.119)	(-0.543)
Short term-debt	-0.208	-0.481*	-0.039	-0.484*
	(-0.537)	(-1.948)	(-0.097)	(-1.899)
Profitability	0.223	0.377**	0.287	0.295
	(0.793)	(2.006)	(0.998)	(1.600)
Book-to-market	0.089	0.006	0.139	0.000
	(0.845)	(0.142)	(1.218)	(0.004)
Negative book-to-market dummy	0.134*	-0.015	0.159**	-0.020
	(1.748)	(-0.227)	(1.991)	(-0.322)
Momentum	0.147*	0.004	0.147*	-0.013
	(1.712)	(0.081)	(1.659)	(-0.275)
Industry dummies	Yes	Yes	Yes	Yes
Observations	246	536	246	536
Adjusted R^2	0.226	0.281	0.528	0.603

Table 14: Stock returns during Q1 2020 of the Covid-19 crisis with abnormal cash measures

	Raw		*Abnormal*	
	1	2	3	4
Idiosyncratic risk	1.479**	0.736*	0.952	0.360
	(2.155)	(1.661)	(1.352)	(0.818)
Momentum loading	0.648	0.698	-2.427	-1.737
	(0.292)	(0.682)	(-1-113)	(-1.320)
SMB loading	0.382	4.341*	-9653***	-3.935*
	(0.138)	(1.885)	(-3.390)	(-1.714)
HML loading	1.220*	1.527***	-6.764***	-6.433***
	(1.933)	(4.659)	(-10.624)	(-20.255)
rM - rF	0.027***	0.014***	0.005	-0.010**
	(4.524)	(3.576)	(0.867)	(-2.470)
Constant	-0.121	-0.402*	-0.080	-0.307
	(-0.310)	(-1.756)	(-0.194)	(-1.249)
Industry dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Observations	246	536	246	536
Adjusted R^2	0.226	0.281	0.528	0.603

Table 14: Stock returns Q1 2020 on Refinitiv ESG score and abnormal cash levels. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors.

Table 15: Stock returns during Q1 2020 of the Covid-19 crisis with abnormal cash measures and quartile dummies of ESG

	Raw		*Abnormal*	
	1	2	3	4
ESG 2	0.075	0.016	0.086*	0.008
	(1.547)	(0.531)	(1.658)	(0.267)
ESG 3	0.110**	0.000	0.119**	-0.005
	(2.433)	(-0.005)	(2.550)	(-0.174)
ESG 4	0.110**	0.001	0.126**	0.003
	(2.190)	(0.025)	(2.377)	(0.101)
Excess cash	0.141*		0.153*	
	(1.849)		(1.952)	
Insufficient cash		0.071		0.071
		(1.637)		(1.574)
Constant	0.125	-0.416	0.192	-0.299
	(0.283)	(-1.636)	(0.410)	(-1.096)
Industry dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Observations	246	536	246	536
Adjusted R^2	0.233	0.278	0.532	0.601

Table 15: Stock returns Q1 2020 on quartiles of Refinitiv ESG score and abnormal cash holdings. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. For brevity we have excluded control variables from the table. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors.

As expected, we see that having excess cash holdings before the start of the crisis is associated with better performance. For firms with insufficient cash the results are inconclusive for both ESG and cash. There is a positive, but small effect on returns from the insufficient cash variable on raw returns in table 14. This effect diminishes when introducing the quartile dummies of ESG levels. We see that the short-term debt variable is consistently impacting firms with insufficient cash holdings negatively, while we do not see the same effect on firms with excess cash holdings.This is also consistent with the findings in model 2 where interest rates had a negative impact on firms with low liquidity. In light of the findings of Acharya and Steffen (2020), we hypothesize that firms with insufficient levels of cash before the crisis started relied more on debt financing than firms starting off with higher cash holdings. There is also research that shows a positive connection between ESG and cost of debt Ferriani (2023), suggesting that these firms are more subject to the costs of debt, hence have a lower ESG rating. Since the ESG is not significant, we believe that this sample is dominated by firms in the lower quartiles of ESG. Thus, ESG and initial cash holdings does not have a significant impact on these firms.

We see that the third and fourth quartile of ESG have a positive impact on returns in firms that have excess cash holdings. The impact of ESG is asymmetrical and depends on the level of ESG as shown in table 15. It supports the findings of a U-shaped ESG impact that professional researchers have found (See El Khoury et al. (2022); Barnett and Salomon (2012)). As high levels of ESG performance is associated with lower cost of debt and equity, firm valuation is higher which in turn leads to better performance ((El Khoury et al., 2022) and Barnett & Salomon, (2012)). We introduce the interaction term to test whether the ESG effect is stronger for these firms.

Table 16: Stock returns during Q1 2020 of the Covid-19 crisis with abnormal cash measures and their interaction

	Raw		*Abnormal*	
	1	2	3	4
ESG	0.038	0.007	0.056	0.007
	(0.847)	(0.242)	(1.162)	(0.249)
Excess cash	-0.252		-0.210	
	(-1.005)		(-0.761)	
Insufficient cash		0.053		0.061
		(1.112)		(1.184)
Cash*ESG	0.095*	-0.003	0.089	-0.002
	(1.705)	(-1.343)	(1.442)	(-0.774)
Constant	0.028	-0.400*	0.059	-0.305
	(0.072)	(-1.742)	(0.147)	(-1.241)
Industry dummies	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Observations	246	536	246	536
Adjusted R^2	0.239	0.280	0.534	0.602

Table 16: Stock returns Q1 2020 on Refinitiv ESG score, abnormal cash holdings and interaction variables. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All t-statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors.

The positive interaction between levels of cash and ESG only holds on the 10% level for excess cash holdings on raw buy-and-hold returns. The excess cash holdings combined with ESG performance suggests that the ESG and firm performance link is stronger for firms with higher cash holdings. El Khoury et al. (2022) found the same relationship between ESG and cash holdings during the pandemic for returns on assets, but not from stock returns. Our results suggest the same, namely that this interaction-effect is not consistent enough in our models to draw a conclusion.

For insufficient cash holdings, we use the same logic in our interpretation. Firms with insufficient cash holdings may have to cut investments in ESG to maintain stable operations. Having insufficient cash holdings by the end of 2019 is an indication of firms having liquidity problems before the crisis, and thus already having declining ESG ratings. These firms are limited from reaping the benefits of better firm performance from high ESG ratings.

5 Conclusions

Going back to Sissener's statement, we would like to add a few moderations to his statement. We studied firms in the US S&P 1500 index. In our sample, high cash holdings are positive combined with social responsibility. We saw that when ESG ratings were high, there was a premium on the marginal value of cash. On the other hand, when ESG performance were low, our results suggest that cash was valued negatively. In fact, when ESG factors are controlled for, having excess cash holdings is associated with agency problems, idle investments, and information asymmetry. All leading to investors devaluing these cash holdings. These findings are in support of hypothesis 1, and 3.

We might intrigue Sissener in suggesting that having lower levels of cash will help his portfolio grow. More precisely, we have throughout our analyses seen that having a balanced and optimal level of cash yields results. Firms that operate with lower cash holdings seems to be better at putting their resources to good use and create value. On the other hand, we should be mindful of investing in high-ESG firms if they have financial constraints. If a high ESG performance is combined with low cash levels, ESG may be viewed as an unproductive investment by the US market.

When testing our second hypothesis, we further looked at corporate governance mechanisms and how they impacted the market valuation of cash. We found that when firms fail to take care of their shareholders, the market do not trust firms investing in ESG while keeping large cash holdings and devalued these resources. We looked at the concept of shareholder protection through a different lens than what we found professional researchers had done. These studies look at geographical differences. In our model we have

tried to find the same results, but for firm-specific variations. We do not look at an exogenous entity such as a country's legal system and its enforcement of shareholder rights, but rather how the firms themselves regulate their treatment of shareholders within the boundaries of local legislation and institutions.

When analyzing the impact of ESG performance isolated, we found that ESG is valued negatively on a general basis supporting our fourth hypothesis. This is consistent with recent research that suggests a negative impact from ESG performance on US firms. This effect is different during the market crisis caused by the Covid-19 pandemic. During market crises, research have shown that ESG is viewed positively by investors. During crises researchers argue that information asymmetry is higher and the general trust in firms is lower. High ESG signals trust during these times and investors may be more inclined to value these firms higher. The effect from ESG in our sample had a positive impact on returns during the first quarter of 2020, the initial market melt-down. A result in favor of hypothesis 5. We found that the CSR component of ESG (E and S pillars) explained the higher returns, not the governance pillar.

The role of cash holdings during the Covid-19 pandemic was an important factor in firms' survival. We saw that having larger cash holdings before the crisis started were associated with better performance. We tested whether cash holdings could have an amplifying effect on the positive effect from ESG. The assumption was that firms with higher cash holdings are able to invest in ESG and gaining the advantages ESG performance provides. We did find an indication of this on raw returns, but we stand cautious in

making any conclusions on hypothesis 6.

Firms with low liquidity before the Covid-19 pandemic seem to rely more on debt financing. The short-term debt had a negative impact on these firm's performance. The findings from model 2, that illiquid firms had a pronounced negative impact from interest rates underlines this assumption. As financially constrained firms may reduce their investments in ESG, we find no effect from ESG on these firms.

5.1 Limitations

This thesis has limitations that needs to be acknowledged. As we are not professional researchers, there are limitations in methodological approaches, interpretation of professional researchers' articles as well as the handling of data. As Erhart (2022) states, choosing the right provider of ESG analytics is important. The Refinitiv ESG ratings is sector-specific and not comparable between industries and something that may compromise our results and subsequently our conclusions. We believe that robustness tests with other ESG providers should have been done as well. Our approach to *clean out* the shareholder element in the ESG ratings may also not have been the best approach and possibly endogenous. We found it difficult to find another accessible proxy for domestic shareholder protection.

The third model in our thesis is based on the model by Lins et al. (2017), which has been criticized by other researchers. Criticism has been made about the internal- and external validity of the inferences used, especially for the results by Lins et al., (2017). In this study by Berkman et al. (2021), the researchers argue that Lins et al. (2017) got inflated t-statistics due to cross-correlated abnormal returns when they used a single event for large sample panel regressions, questioning the internal validation. Berkman et al.

(2021) thus finds no evidence that high CSR firms outperformed low CSR firms, using a similar example of US stocks. These results should be taken into consideration in our thesis.

APPENDIX

Table 21: Pearson correlation matrix for variables used in model 2

	Firm value	EBIT	EBIT △	EBIT △ fwd	Net assets △	Net assets △ fwd	R&D	R&D △	R&D △ fwd	I-rates	I-rates △	I-rates △ fwd	Dividends	Dividends △	Dividends △ fwd	Firm value △ fwd	ESG	Abnormal cash	Excess cash	Insufficient cash	Shareholder score	Social pillar	Governance pillar	Enviromental pillar	ESG net of SH score
Firm value	1	-0.130	0.128	0.104	0.212	0.333	0.511	-0.504	0.461	0.079	-0.031	-0.072	0.119	-0.089	-0.015	-0.329	-0.116	0.020	0.392	0.083	-0.048	-0.071	-0.134	-0.142	-0.152
EBIT	-0.130	1	0.014	-0.422	-0.013	-0.090	-0.424	0.584	-0.612	-0.277	-0.104	-0.024	0.213	-0.109	-0.003	0.042	0.090	0.376	-0.013	-0.182	0.021	0.145	0.171	-0.090	0.041
EBIT △	0.128	0.014	1	-0.040	0.065	0.069	0.082	-0.225	0.077	0.105	-0.091	-0.085	-0.014	0.059	0.016	-0.062	-0.080	-0.090	0.002	0.112	0.006	-0.117	-0.025	-0.009	-0.061
EBIT △ fwd	0.104	-0.422	-0.040	1	-0.014	0.089	0.182	-0.202	0.088	0.148	0.071	-0.100	-0.053	0.022	0.062	0.069	-0.015	-0.185	-0.025	0.061	-0.001	-0.053	-0.050	0.049	0.005
Net assets △	0.212	-0.013	0.065	-0.014	1	0.181	0.063	-0.182	0.099	-0.038	-0.122	0.081	-0.095	-0.273	0.018	-0.093	-0.085	0.073	0.163	0.051	-0.053	-0.036	-0.088	-0.073	-0.090
Net assets △ fwd	0.333	-0.090	0.069	0.089	0.181	1	0.173	-0.178	0.060	0.041	-0.033	-0.187	-0.016	0.006	-0.098	-0.355	-0.084	0.030	0.199	0.029	-0.043	-0.060	-0.089	-0.078	-0.096
R&D	0.511	-0.424	0.082	0.182	0.063	0.173	1	-0.604	0.613	0.130	0.033	-0.001	-0.077	0.033	-0.005	-0.026	-0.067	-0.396	0.113	0.196	-0.042	-0.036	-0.187	-0.009	-0.072
R&D △	-0.504	0.584	-0.225	-0.202	-0.182	-0.178	-0.604	1	-0.780	-0.211	0.017	0.040	0.073	-0.019	0.004	0.074	0.223	0.207	-0.266	-0.241	0.074	0.230	0.195	0.076	0.195
R&D △ fwd	0.461	-0.612	0.077	0.088	0.099	0.060	0.613	-0.780	1	0.194	0.034	0.011	-0.070	0.033	0.004	0.001	-0.155	-0.212	0.241	0.171	-0.088	-0.151	-0.196	-0.032	-0.135
I-rates	0.079	-0.277	0.105	0.148	-0.038	0.041	0.130	-0.211	0.194	1	0.167	-0.280	-0.035	0.044	-0.022	0.029	-0.074	-0.237	-0.018	0.069	-0.002	-0.112	-0.068	0.019	-0.051
I-rates △	-0.031	-0.104	-0.091	0.071	-0.122	-0.033	0.033	0.017	0.034	0.167	1	0.059	0.034	0.055	-0.026	0.029	0.013	-0.029	0.030	0.007	0.001	0.008	-0.010	0.027	0.016
I-rates △ fwd	-0.072	-0.024	-0.085	-0.100	0.081	-0.187	-0.001	0.040	0.011	-0.280	0.059	1	0.018	-0.066	0.029	0.044	0.024	0.021	-0.011	-0.003	0.006	0.028	0.005	0.010	0.022
Dividends	0.119	0.213	-0.014	-0.053	-0.095	-0.016	-0.077	0.073	-0.070	-0.035	0.034	0.018	1	-0.396	-0.364	-0.012	0.080	0.115	0.074	-0.026	0.022	0.082	0.037	0.044	0.088
Dividends △	-0.089	-0.109	0.059	0.022	-0.273	0.006	0.033	-0.019	0.033	0.044	0.055	-0.066	-0.396	1	0.144	0.022	-0.019	-0.071	-0.038	0.013	0.003	-0.035	0.005	0.008	-0.019
Dividends △ fwd	-0.015	-0.003	0.016	0.062	0.018	-0.098	-0.005	0.004	0.004	-0.022	-0.026	0.029	-0.364	0.144	1	0.056	0.009	0.010	0.005	-0.001	0.003	0.011	-0.002	0.002	0.011
Firm value △ fwd	-0.329	0.042	-0.062	0.069	-0.093	-0.355	-0.026	0.074	0.001	0.029	0.029	0.044	-0.012	0.022	0.056	1	0.053	-0.101	-0.191	-0.010	-0.012	0.050	0.024	0.086	0.068
ESG	-0.116	0.090	-0.080	-0.015	-0.085	-0.084	-0.067	0.223	-0.155	-0.074	0.013	0.024	0.080	-0.019	0.009	0.053	1	0.044	-0.053	-0.067	0.217	0.867	0.621	0.768	0.965
Abnormal cash	0.020	0.376	-0.090	-0.185	0.073	0.030	-0.396	0.207	-0.212	-0.237	-0.029	0.021	0.115	-0.071	0.010	-0.101	0.044	1	0.608	-0.239	-0.013	0.089	0.095	-0.077	0.016
Excess cash	0.392	-0.013	0.002	-0.025	0.163	0.199	0.113	-0.266	0.241	-0.018	0.030	-0.011	0.074	-0.038	0.005	-0.191	-0.053	0.608	1	-0.025	-0.076	-0.015	-0.013	-0.106	-0.072
Insufficient cash	0.083	-0.182	0.112	0.061	0.051	0.029	0.196	-0.241	0.171	0.069	0.007	-0.003	-0.026	0.013	-0.001	-0.010	-0.067	-0.239	-0.025	1	0.0002	-0.120	-0.116	-0.009	-0.061
Shareholder score	-0.048	0.021	0.006	-0.001	-0.053	-0.043	-0.042	0.074	-0.088	-0.002	0.001	0.006	0.022	0.003	0.003	-0.012	0.217	-0.013	-0.076	0.0002	1	0.108	0.386	0.084	0.150
Social pillar	-0.071	0.145	-0.117	-0.053	-0.036	-0.060	-0.036	0.230	-0.151	-0.112	0.008	0.028	0.082	-0.035	0.011	0.050	0.867	0.089	-0.015	-0.120	0.108	1	0.328	0.590	0.810
Governance pillar	-0.134	0.171	-0.025	-0.050	-0.088	-0.089	-0.187	0.195	-0.196	-0.068	-0.010	0.005	0.037	0.005	-0.002	0.024	0.621	0.095	-0.013	-0.116	0.386	0.328	1	0.289	0.581
Enviromental pillar	-0.142	-0.090	-0.009	0.049	-0.073	-0.078	-0.009	0.076	-0.032	0.019	0.027	0.010	0.044	0.008	0.002	0.086	0.768	-0.077	-0.106	-0.009	0.084	0.590	0.289	1	0.832
ESG net of SH score	-0.152	0.041	-0.061	0.005	-0.090	-0.096	-0.072	0.195	-0.135	-0.051	0.016	0.022	0.088	-0.019	0.011	0.068	0.965	0.016	-0.072	-0.061	0.150	0.810	0.581	0.832	1

Table 22: Pearson correlation matrix for variables used in model 3

	Q1_returns_win	Abnormal_Q1_returns_win	ESG_2019	excess_cash_scaled_win_constrained	insufficient_cash_scaled_abs_win	size_2019_win	LT_debt_2019_win	ST_debt_2019_win	profitability_2019_win	btm_2019_win	momentum_win	IdioSR_Q1_win	MOM_loading_Q1	SMB_loading_Q1	HML_loading_Q1	risk_premium_Q1	log_social	log_governance	log_environmental
Q1_returns_win	1	0.279	0.024	0.202	0.137	-0.104	-0.052	-0.110	0.183	-0.123	0.103	0.037	0.084	0.038	0.366	0.170	0.023	-0.049	0.033
Abnormal_Q1_returns_win	0.279	1	-0.038	-0.004	-0.088	-0.097	0.048	-0.070	0.015	0.274	-0.050	0.071	-0.155	-0.101	-0.682	-0.203	-0.086	0.026	-0.020
ESG_2019	0.024	-0.038	1	-0.198	-0.146	0.145	0.119	0.021	0.056	-0.114	-0.025	-0.305	-0.027	0.290	0.021	0.006	0.812	0.494	0.683
excess_cash_scaled_win_constrained	0.202	-0.004	-0.198	1	0.097	-0.204	-0.049	-0.119	0.063	-0.029	-0.033	0.202	-0.027	-0.165	0.227	-0.085	-0.146	-0.154	-0.106
insufficient_cash_scaled_abs_win	0.137	-0.088	-0.146	0.097	1	-0.213	-0.022	0.113	0.104	-0.116	0.057	0.345	0.035	-0.231	0.279	-0.116	-0.125	-0.110	-0.180
size_2019_win	-0.104	-0.097	0.145	-0.204	-0.213	1	0.178	0.164	-0.371	-0.300	0.003	-0.309	0.029	0.159	-0.072	0.131	0.195	0.086	0.159
LT_debt_2019_win	-0.052	0.048	0.119	-0.049	-0.022	0.178	1	0.020	-0.041	-0.111	0.032	-0.073	-0.037	0.076	-0.117	-0.0004	0.115	0.075	0.137
ST_debt_2019_win	-0.110	-0.070	0.021	-0.119	0.113	0.164	0.020	1	-0.061	-0.052	-0.002	-0.054	0.082	0.073	-0.078	0.079	0.048	0.010	0.005
profitability_2019_win	0.183	0.015	0.056	0.063	0.104	-0.371	-0.041	-0.061	1	-0.183	0.089	-0.001	0.025	0.075	0.108	-0.030	0.039	0.011	0.007
btm_2019_win	-0.123	0.274	-0.114	-0.029	-0.116	-0.300	-0.111	-0.052	-0.183	1	-0.287	0.148	-0.121	-0.055	-0.300	-0.120	-0.164	-0.0001	-0.055
momentum_win	0.103	-0.050	-0.025	-0.033	0.057	0.003	0.032	-0.002	0.089	-0.287	1	0.045	0.133	-0.059	0.166	-0.170	0.001	-0.025	-0.014
IdioSR_Q1_win	0.037	0.071	-0.305	0.202	0.345	-0.309	-0.073	-0.054	-0.001	0.148	0.045	1	-0.100	-0.539	0.181	-0.347	-0.296	-0.109	-0.287
MOM_loading_Q1	0.084	-0.155	-0.027	-0.027	0.035	0.029	-0.037	0.082	0.025	-0.121	0.133	-0.100	1	0.034	0.047	0.184	-0.041	-0.057	-0.075
SMB_loading_Q1	0.038	-0.101	0.290	-0.165	-0.231	0.159	0.076	0.073	0.075	-0.055	-0.059	-0.539	0.034	1	-0.136	0.209	0.236	0.112	0.229
HML_loading_Q1	0.366	-0.682	0.021	0.227	0.279	-0.072	-0.117	-0.078	0.108	-0.300	0.166	0.181	0.047	-0.136	1	0.005	0.089	-0.075	0.024
risk_premium_Q1	0.170	-0.203	0.006	-0.085	-0.116	0.131	-0.0004	0.079	-0.030	-0.120	-0.170	-0.347	0.184	0.209	0.005	1	-0.018	0.003	-0.001
log_social	0.023	-0.086	0.812	-0.146	-0.125	0.195	0.115	0.048	0.039	-0.164	0.001	-0.296	-0.041	0.236	0.089	-0.018	1	0.270	0.666
log_governance	-0.049	0.026	0.494	-0.154	-0.110	0.086	0.075	0.010	0.011	-0.0001	-0.025	-0.109	-0.057	0.112	-0.075	0.003	0.270	1	0.254
log_environmental	0.033	-0.020	0.683	-0.106	-0.180	0.159	0.137	0.005	0.007	-0.055	-0.014	-0.287	-0.075	0.229	0.024	-0.001	0.666	0.254	1

	Firm value	
	Non-crisis	Crisis-periods
ESG	-0.444***	0.093
	(-5.699)	(1.192)
Excess cash	-3.377***	-2.008***
	(-5.164)	(-3.071)
Cash*ESG	0.901***	0.525***
	(6.597)	(3.841)
Constant	1.472***	-0.591*
	(4.786)	(-1.922)
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
Observations	1174	259
Adjusted R^2	0.721	0.619

Robustness test of excess cash, ESG and interaction term on different time periods. Column 1 has the financial crisis of 2007/2008 and the covid-year 2020 excluded. Column 2 is these periods explicitly. The significance levels * , ** and *** are significance on the 10%, 5% and 1% respectively. All T statistics in parenthesis are adjusted for heteroscedasticity by using robust standard errors clustered at firm-level.

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