ENVIRONMENTAL, SOCIAL, AND GOVERNANCE DISCLOSURE IMPACT ON CASH HOLDINGS IN OECD COUNTRIES

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OPEN ACCESS

How to cite this paper: AlHares, A., AlEmadi, N., Abu-Asi, T., & Al Abed, R. (2023). Environmental, social, and governance disclosure impact on cash holdings in OECD countries. *Journal of Governance & Regulation, 12*(2), 104–119. https://doi.org/10.22495/jgrv12i2art10

ISSN Online: 2306-6784
ISSN Print: 2220-9352

Received: 09.10.2022
Accepted: 01.05.2023

JEL Classification: G32, G34, G38, G30, M41, M48, M40, D81
DOI: 10.22495/jgrv12i2art10

Abstract

In this research, we investigate how cash holdings are affected by the environmental, social, and governance (ESG) disclosure practices of corporations. This research provides valuable insights into the ongoing discussion all across the world on ESG disclosure, and mainly 5 countries from the Organisation for Economic Co-operation and Development (OECD), which are the United States of America, Canada, the United Kingdom, Japan, and Australia, over the period 2012–2021. We used Refinitiv Eikon database to measure the variables. The results show there is a significantly negative relation between ESG disclosure and cash holdings in the introduction, growth, and shake-out/decline stages. Lower cash holdings are associated with higher firm performance and a positive value of cash. In spite of using different econometric parameters, other measurements, extra control variables, propensity score matching, and an instrumental variable approach, our results remained unchanged (Arayssi et al., 2020). This paper has recommendations for policymakers, investors, and business organizations. Importantly, our study reveals how higher levels of ESG disclosure lead to better cash-holding practices (Buallay, 2022).

Keywords: ESG, Cash Holdings, OECD, Liquidity, Sustainability, Financial Constraint

Authors' individual contribution: Conceptualization — A.A., N.A., and T.A.-A.; Methodology — A.A. and N.A.; Validation — N.A., R.A.A., and T.A.-A.; Formal Analysis — A.A. and T.A.-A.; Investigation — A.A.; Resources — N.A., R.A.A., and T.A.-A.; Data Curation — A.A., N.A., and T.A.-A.; Writing — Original Draft — A.A., N.A., and T.A.-A.; Writing — Review & Editing — N.A., R.A.A., and T.A.-A.; Supervision — A.A.; Project Administration — N.A., R.A.A., and T.A.-A.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

Environmental, social, and governance (ESG) aspects, more often referred to as non-financial performance, have garnered a significant amount of attention from practitioners and regulators all over the globe. The prior research studies the influence of ESG factors on firm-level outcomes, such as financial performance and market value, cost of equity, default risk, and financial risk. On the other hand, corporate cash holdings, which make for a large fraction of a firm's overall assets, permit managers' discretionary spending. Self-interested management may keep more cash on hand in order to protect themselves from the scrutiny of the market that would take place in the event that a company

submitted an application for external finance (Gu, 2020). It is possible for such amounts of cash holdings to give rise to an agency issue since the return on cash holdings is less than the necessary cost of capital, and double taxation. Having an effective monitoring system in place (both internally and externally) is recommended as a possible solution to the issue with the agency and an ESG disclosure acts as both an internally and externally applicable monitoring tool. Nevertheless, the influence of ESG disclosure as a governance device on cash-holding choices has received little attention in the aforementioned literature (Arayssi et al., 2020).

According to the corporate life-cycle theory, businesses follow a predetermined progression from one stage of development to the next stage of development, with each step being different and irreversible in its own right. The structures, skills and strengths, plans, and unpredictability of a company's cash flow will all be different depending on where the company is in its life cycle. Previous research, in accordance with the life-cycle theory, investigates and confirms the relevance of the business life cycle in formulating policies and choices. Given that, companies at various stages of their life cycle adopt different financial policies and may have varying levels of governance mechanisms, it is plausible to expect that the effect of ESG disclosure on corporate cash holdings is likely to differ across the lifecycle stages (Buallay, 2022). This is due to the fact that firms at various stages of their life cycle adopt different levels of governance mechanisms. This investigation of the impact of ESG disclosure on cash holdings over all four phases of a company's life cycle is an effort to fill a gap that has been identified in the existing body of research.

The Organisation for Economic Co-operation and Development (OECD) promotes the use of good governance and demonstrates the importance of nations working together with the same overall goals of improving their governance structures and mechanisms, learning from each other, and cooperating on common issues. These countries differ with respect to their legal, accounting, and auditing practices, as well as ownership and debt issues, and have greater protection for shareholders, particularly minority shareholders.

Using a panel of Standard & Poor's (S&P) 500 indexed firms with 75 firm-year observations for the period 2012–2021 from 5 OECD countries, which are the United States of America, Canada, the United Kingdom, Japan, and Australia, we find a significantly negative relation between overall ESG disclosure and cash holdings, consistent with prior literature. We further find higher cash holdings in the introduction, growth, and shake-out/decline stages, and lower in the mature stages. These findings indicate that firms with better ESG disclosure have lower cash holdings because they have easier access to the capital market as a result of their moral capital. Our further analysis shows better performance, as well as a positive value of cash holdings in the introduction, growth, and shake-out/decline stages for firms with better ESG disclosure. Furthermore, our results remain robust and consistent when using alternative measures.

Our contribution to the literature is offering empirical data on the influence of ESG disclosure on cash holdings at different periods during a company's life cycle. The study provides valuable insights into the ongoing discussion all across the world on ESG disclosure, and mainly 5 countries from the OECD. We contribute to the emergent literature that non-financial disclosures provide incremental information to investors and other stakeholders. According to our analysis, ESG disclosure serves as a comprehensive governance framework that allows for both internal and external monitoring objectives. Our study contributes to the continuing discussion concerning the value of ESG disclosure for businesses, investors, and other stakeholders.

The remainder of this paper is organized as follows. Section 2 discusses the literature review. Section 3 presents the research design. Section 4 provides empirical results and a discussion of the findings. Finally, Section 5 concludes the paper.

2. LITERATURE REVIEW

Entrepreneurs and philosophers all over the world had opened their eyes to ESG disclosure. Researches that are studying the influence of ESG disclosure on firm-level results are becoming more and more putative.

Distinguishing between general and ESG-specific sources is an important task for businesses and investors looking to understand and manage the potential risks and opportunities associated with ESG issues. General sources of information include financial news and analysis, business publications, and government reports. These sources provide broad-based information about economic conditions, market trends, and company performance. They can be useful for gaining a broad understanding of the overall economic and business environment. However, they may not provide detailed information about specific ESG issues, such as a company's environmental footprint or human rights record.

On the other hand, ESG-specific sources are specifically focused on providing information about environmental, social, and governance issues. These sources may include sustainability reports, independent research reports, and ESG ratings and rankings. They provide a more detailed look at how a company is managing specific ESG issues, such as its carbon emissions, labor practices, and governance structure. ESG-specific sources can be particularly useful for investors and businesses looking to understand the potential risks and opportunities associated with specific ESG issues. Similarly, an ESG rating or ranking can provide a quick and easy way to compare a company's performance on specific ESG issues to its peers.

The agency problems exist in three different ways in terms of the respective ESG activities. In the first case, when the managers spend the organizational resources for their own individual gains. Managers may at times undertake their ESG activities to serve their own personal interests or make investments to attain their varied private benefits through the building of their respective reputations, similar to that of the citizens at the expense of the shareholders (Barnea & Rubin, 2010). In this case, ESG engagement is considered a net misappropriation of resources, with the endgame being a reduction in the performance of the firms. In the second case, the ESG activities

may also translate to the different firms sacrificing projects that become profitable for the respective firms. In this case, the corporate social accomplishments involving financial costs obtained from the organizational capital and other resources may hinder the progress of the firm, especially those that are not active socially. Thirdly, the opportunism of the management teams' arguments also informs that managers often employ the firm resources for engaging in different ESG activities to limit negative attention and to cater for any justifications of poor performance that may be witnessed at the end of every financial year. This is often considered window dressing. The majority of the ESG activities are undertaken with the goal of obtaining impressive publicity as a move to cover for weak performance. In the current study, the agency theory is extended to take care of the ESG engagements with the various cash holdings and offer arguments that the agency problems may be applicable to the various cash holdings with respect to the various ESG decisions. This translates to the agency's perspective, hence resulting in the first hypothesis.

According to the literature, it is often assumed that firms having higher levels of liquidity or no relevant financial constraints are likely to suffer from agency-related problems in terms of their various ESG activities. The increased liquidity, as explained by capital expenditure, and free cash flows can be a clear indication of the various agency problems, lined with the various ESG activities (Kruger, 2015; Ferrell et al., 2016). In most cases, cash is considered the most liquid asset since it offers managers high levels of freedom on how to spend and to make expenditure decisions for the different firms, hence creating avenues for diverting finances for personal benefit. This informs that a higher level of liquidity that is desired is a challenge to the performance of organizations. In this case, the liquidity measure that works alongside ESG would affect the financial performance of various organizations negatively. Nonetheless, Ferrell et al. (2016) indicated that increased financial constraints, as explained by the high dividend and leverage proxies can always aid in reducing underlying agency problems owing to the close monitoring of the shareholders and the market. The cash flows originating from debt interest rates could always aid in preventing managers from undertaking projects that are less profitable or activities likely to generate benefits to various individuals. The higher financial constraints can always act as prevention mechanisms for the management's resource misuse at all times. In this case, the variables associated with the financial constraints in relation to ESG disclosure would therefore result in some positive relationships with the financial performance of various cash holdings.

The stakeholder theory indicates that better firms often manage their relationships with all their stakeholders hence increasing their levels of success over time. The stakeholders comprise groups or individuals who are affected either negatively or positively by the actions of the firms. The theory suggested by Freeman (1984) informed that the real success of companies was in the levels of satisfaction it had on the various shareholders. According to the stakeholder theory, most of the activities associated with ESG disclosure were moved in the market performance of the specified firms. For instance, happy and satisfied employees will always be motivated at all times in their different jobs. The satisfied customers present loyalty, satisfied suppliers offer discounts among others, hence the betterment of the reputation of the firm, hence improved financial performance of the various firms, extended to sustainability. El Ghoul et al. (2017) indicated that ESG activities had a positive effect on the performance of the various firms owing to these ESG activities can always aid in resolving conflicts between stakeholders and managers at all times. This explains that the existing policies are ESG initiatives that are active, hence important for the protection of the organizational value hence extending to a rise in the shareholder values.

Since the cash holdings are built around ethical standards and moral settings, there is a possibility that improvement in their practices in terms of the ESG disclosure would result in fostered relationships between the stakeholders and the possible beneficiaries in the short and long-run. The existence of abundance in internal resources is considered as financial slack and is appropriate for the various firms that are often engaged in ESG disclosure, as the other ESG expenditures are quite discretionary with time. As explained by Kraatz and Zajac (2001), financial slack is termed as handy to asset measures including cash and other liquid assets that can be deployed with ease. As the various benefits attached to ESG disclosure are often uncertain, in the case of small financial slack existing, the firms would have the ability to carry much of the existing ESG activities and relay some proper signals to different stakeholders when required. Campbell (2007) indicated that firms having an abundance of resources had more ability to absorb a series of costs and were increasingly willing to take care of the environmental and social engagements within their varied business strategies. AlHares, Ntim, King, et al. (2018) noted that financial slack was a moderating variable with its effects realized on different ESG disclosure practices and the mentioned firm performance. On the various cash holdings, the existence of financial slack is quite instrumental since it gives firms the mandate to engage in various ESG activities over time. It is appropriate to work on the assumption that these cash-holding firms having increasingly higher financial slack are inclined to engage in more ESG activities, unlike firms with less financial slack. This demonstrates the need to examine the changes in financial slack on the cash holdings' performance over the years.

According to Aouadi and Marsat (2018), ESG controversies are obtained from negative news from a number of ESG activities to erode the reputation of banks. These ESG controversies often pose the question of the legitimacy of actions by the various banks to their immediate board members. The legitimacy theory offers a better explanation of the impact of these ESG controversies on the performance of banks. Furthermore, it also points to board composition, with the aspect of gender also unpacked as a key determinant of the performance of different firms, including banks.

Legitimacy is defined as the general perception or assumption that informs that the actions of any

entity are desired, appropriate, and proper with some socially developed norms, beliefs, values, and definitions among others. Most of the ESG controversies around banks are less desirable as they cost the goodwill of individuals and often harm the profitability of various organizations. Banks having more controversies may always make attempts to legitimize their actions through disclosure of more information across various ESG activities which translates to greater harm across the profitability of banks, weakening their financial positions, and making the banks less able to make investments in the various ESG activities. In this case, instead of the banks realizing profits from their varied operations, they only incur losses, hence worsening their financial position across different financial periods.

The ESG controversies of banks are less desirable, especially when it affects the goodwill of the banks and extends to harming the bank's profitability. Banks having more controversies often attempt to legitimize their actions through the disclosure of more information in relation to the different ESG activities and later make investments in ESG-linked activities or projects to increase the levels of trust among the stakeholders involved.

Nonetheless, the ESG controversies often translate to increased harm to the profitability of banks and hence weaken their respective financial positions, since banks are less able to make investments in the said activities. The ESG performance of the banks may often reduce based on the underlying ESG controversies over time. The company board members often take strategic decisions like that of ESG disclosure to ensure the various needs of the companies or firms are met.

The female members of the board are more concerned with the welfare of their male counterparts across the various ESG activities over time (Arayssi et al., 2020). Furthermore, they also consider the underlying ESG controversies as seriously as possible. The diversity of the board gender diversity is helpful to banks since it helps them act on the various ESG activities and monitor the different controversies associated with the improvement of reputational damages. The current study attempts to test for the ESG controversies of banks and check whether they would have any association with organizational performance over various periods. Furthermore, the study is expected to fill the gaps from other studies since cash holdings were less involved, but banks majorly used in testing for the effects of ESG disclosure on firm performance over the past years.

Most of these corporate actions are undertaken with the aim of raising the cash holding levels to make them more agents to be used by financially distressed firms to better their cash reserves (Gu, 2020). Some of the strategies that may be criticized for businesses are built on ethics and considered to present relevant financial conditions such as avoidance of taxation and management of earnings among others. Firms with signs of financial distress implement a set of strategies to get back to their initial financial situations. These solutions entail a restructuring of capital, replacing cash dividends with some share repurchases, increasing monitoring functions, and a reduction in the amount of compensation offered to the CEOs.

On all the existing alternatives, managing corporate reporting is also an important approach for firms that are distressed financially. In most cases, corporate reporting is important for the management teams to ensure that their operational outcomes are well reported across different financial periods. One of the types of reporting that are aimed at improving the value of the firm is ESG disclosure reporting. Moreover, the past studies that entailed over 2000 empirical studies informed that there existed a positive relationship between firm performance and ESG disclosure reporting across the respective organizations (Gu, 2020). This informed that an improvement in the levels of ESG disclosure led to a growth in firm performance over the different periods. Moreover, another finding from documents from firms that were audited on ESG reports from both Indonesia and Malaysia informed higher values for the non-audited unlike those from the audited ESG reports. This indicated that the variations in the audits demonstrated differences in the levels of firm performance as explained by the results obtained.

Other studies examining some of the key sub-topics on the ESG reports extended to carbon disclosures, to demonstrate that increased quality of carbon disclosures led to increased firm performance (AlHares & Ntim, 2017). This informed that such companies were compliant with net-zero carbon emissions to ensure a significant decline in the level of emissions across the different companies. The study also provided a conclusion that ESG disclosure reporting was essential in assisting the management teams to exploit and identity their varied areas of competitive advantage, hence improving its performance as expected (Buallay, 2022). Some of the ESG reports examined the extent of the different financially distressed firms in terms of their relevant financial performance over the past years. For example, Indonesia was one of those countries that had great levels of state-owned corporations or organizations facing severe financial challenges (Harymawan et al., 2020). It was witnessed that ESG disclosure reporting was one of the desired approaches appropriate for preventing the levels of financial distress across the respective listed firms.

Al-Hadi et al. (2019) undertook another study to examine the relationship between the possibility of financial distress and ESG reporting. From the 651 Australian firms that were publicly listed with their data from the 2007–2013 period, the analysis informed that there existed a negative relationship between financial distress and ESG activities. Moreover, they also witnessed the existence of some relationship between ESG disclosure and financial distress in the future stages of the different organizations. Lin and Dong (2018) also witnessed in their study that financial distress was likely to translate to bankruptcy among the affected firms. This indicated that the changes in terms of the financial situation of the different organizations would be linked to the financial management element over time. The study informed that there existed empirical evidence for benefits associated with ESG reporting, especially on financially distressed firms. Moreover, it was also noted that there exists a positive association between financial distress and ESG reporting, in line with the

management theory provisions (Staszkiewicz & Werner, 2021). Within society, financially distressed firms were revealed by stakeholders since most of the managers or agents could not report owing to some instances of malpractice therein. After the revelation of these issues of financial distress, the stakeholders incorporate ways to be motivated to increase returns optimally and minimize relevant punishments to the management to make the organizational image correlate with their social roles (Flower, 2015). Moreover, this is also meant to improve the reputation of the organization owing to the problems of financial distress reported over time. Most of these motivations are pegged on the ability of the distressed firms to undertake proper management strategies, relating to the discretionary disclosure over the different timelines, such as the relevant ESG reporting over the respective timelines. Despite the ESG reports being able to be used for window dressing, the management impressions translate to financial distress among firms to ensure proper ESG reporting is met (Farooq, 2015). There exist beliefs that motivated members of the management of the respective financially distressed firms may translate to proper ESG reports to their various stakeholders. The possibility of having buffered business risks that accrue around the social capital provisions is key in reducing the levels of financial distress among different firms.

Oh (2017) implies that debates on ESG reports often benefit from the justification of the ESG reports with the solution for the different business conditions that may always be beyond the anticipated claims. Stead and Stead (2013) inform that the benefits of ESG reporting on financial distress minimization are applicable for the matured firm, though not properly documented within the early stages of the various firms. In referring to the ESG report as the sustainable strategic management components inform the need for the management to shift from the economic (neoclassical) to open systems assumptions within the existing ecological economics over time. The change in mindset without a doubt often desires proper substantial investments with the cost and expertise implementation desired (AlHares, 2017). Most of the extra costs and expertise may always be covered across different firms, majorly for the firms that are considered financially distressed. Within the context of financial distress, it is the management that fails to experience ESG reporting benefits, unlike those who have no alternatives to implement.

Furthermore, there exist studies that inform that the low levels of financial distress risks of ESG-linked firms may fail to be realized from the high resources required to be in the desired levels of control (Nasih et al., 2019). Failure of the ESG reports across financially distressed firms may also be linked to other theories such as stakeholder and stewardship theories. The psychology-linked theory informs that human being main motivation is always to build, protect and enhance resources at their disposal to protect individual and social bonds that often support them. This is the first principle that is linked to the loss of resources in disproportionate salient features unlike resource gains (Gretz & Malshe, 2019). The first resources employed in ESG reporting exist in individual and few momentums and some substantial amounts. The resistance of firms should be increased based on the theory, despite the different benefits realized in the future.

Financial distress offers a clear reflection of the different conditions that are majorly limited to resource access (Stead & Stead, 2014). Moreover, the stakeholders and the management teams are expected as having entered the defensive mode for preserving the resources of the various firms, with irrational, aggressive, and defensiveness over the years. Merged with the stakeholder theory that works on the assumption that the management teams will always put proper efforts to meet the needs of the stakeholders (AlHares & Dominic, 2021). This informs that financially distressed firms often put their best efforts and strategies to meet the needs of various stakeholders, hence it would be financially distressing in terms of offering the best forms of ESG reporting (Kruger, 2015). The last aspect of ESG disclosure exists in the view of shareholders' expenses. In terms of this perspective, the ESG stakeholders unlike the shareholders get help from ESG reports, hence influencing the wealth of the various stakeholders. According to all the mentioned above, it is hypothesized that the impact of ESG disclosure on cash holdings differs in each life cycle:

H1: There exists a negative relationship between ESG disclosure and the performance of the respective cash holdings.

H2: Liquidity of firms has mediating negative effect on ESG disclosure to performance of the different cash holdings.

H3: Financial constraint has a positive effect on the performance of cash holdings.

H4: There exists a positive link between the ESG measures and cash holdings performance over the years.

3. RESEARCH DESIGN

Standard & Poor's (S&P) 500 indexed 75 companies make up our first sample from five OECD countries, which are the United States of America, Canada, the United Kingdom, Japan, and Australia over the period 2012–2021. These companies were gathered from Refinitiv Eikon databases. The Refinitiv Eikon databases scoring methodology contains standardized worldwide principles from organizations, such as the United Nations (UN) and the Global Responsible Initiative (GRI). We started off by selecting 750 firm-years that included information on ESG disclosure and accounting measures. We did this without taking into account any differences across industries. Due to the rigorous liquidity constraints, we do not include businesses that are active in the financial services sector. This is in line with previous research (Bates et al., 2009), which reached the same conclusion. In the final sample, we require that the firm-years included in the sample contain both ESG disclosure and accounting data. Inductive research is an alternative method to be used in other studies, it does not set out to find the causal relationships between things. Its goal is to understand the meaning of what is being observed. In other words, the researcher makes certain observations and then moves from these to making general statements about what was observed.

Table 1. Variables definitions

Variables	*Measure*
Panel A: Dependent variables	
Ratio_of_cash	Cash holdings: The ratio of cash and marketable securities to net assets.
Cashta	Cash holdings: The ratio of cash and marketable securities to total assets.
Cash (industry adj.)	Cash holdings: The ratio of cash and marketable securities scaled by industry-adjusted cash holdings.
Ln_Cash	Cash holdings: Log of cash and marketable securities.
Panel B: Independent variables	
ESG_score	Environmental, social, and governance score: ESG disclosure score ranging from 0.1 to 100.
E_score	Environmental score: Environmental disclosure score ranging from 0.1 to 100.
S_score	Social score: Social disclosure score ranging from 0.1 to 100.
G_score	Governance score: Governance score ranging from 0.1 to 100.
ESG_index	ESG index: A variable ranging from 0 to 1 measuring the average extent of ESG disclosure.
FLC	Firm life cycle: A vector of dummy variables that captures different stages of firm life cycle (Dickinson, 2011).
Panel C: Control variables	
RETA	Retained earnings to total assets.
LEV	Leverage: The sum of short- and long-term debt divided by total assets.
CFTA	Cash flow to total assets.
CAPEX	Capital expenditure: The ratio of capital expenditure to total assets.
MTB	Growth opportunities: The market value of equity scaled by the book value of equity.
Div_Dum	Dividend: A dummy variable equal to 1 if the dividend was paid and 0 otherwise.
ROA	Return on assets: Firm net income divided by total assets.
R&D	Total research and development expenditure scaled by total assets.
Size	Size of the firm: Log of total assets.
Firm_age	Age of the firm: The number of years from the year of incorporate as reported in OSIRIS.

4. RESULTS AND DISCUSSION

We follow the methodology of previous studies (Bates et al., 2009) and use the ratio of cash and marketable securities to net assets to determine the level of cash holdings (ratio of cash). Net assets are defined as the book value of the total assets minus cash and marketable securities. We used Refinitiv Eikon databases to measure our research variables. It is important to note that such a measure of cash indicates the financial reserves that are accessible to managers and put at their disposal in relation to the assets. Based on the whole sample, the average cash holdings ratio during the time period covered by our sample is 14.2%, as can be shown in Table 2 (Panel A). This information comes directly from the sample itself. In addition, we classify the companies in the sample into those that have high ESG disclosure and those that have low ESG disclosure based on the sample median. When compared to the subsample with low ESG disclosure, which had an average cash holdings percentage of 17%, the subsample with strong ESG disclosure had 12.2% of average cash holdings. At the 1% level, the mean difference between high and low ESG disclosure is a substantial amount of difference.

Table 2. Descriptive analysis

Variable	*Mean*	*Full sample (N = 750)*				*High ESG*		*Low ESG*		*Mean diff.*	*t-stat.*
		Std. dev.	*1st quartile*	*Median*	*3rd quartile*	*Mean*	*Std. dev.*	*Mean*	*Std. dev.*		
Panel A: Dependent variable											
Ratio_of_cash	0.142	0.161	0.013	0.068	0.075	0.122	0.223	0.170	0.303	0.037***	9.702
Panel B: Independent variable											
ESG_score	18.278	11.751	11.731	13.047	21.377	28.141	13.030	12.006	1.312	16.124***	87.748
E_score	19.632	17.064	6.106	15.514	32.008	21.617	16.955	1.984	1.409	19.621***	15.638
S_score	17.471	14.194	8.661	14.024	23.450	23.805	15.112	6.134	2.736	17.655***	51.660
G_score	51.164	5.867	48.103	51.675	54.246	55.914	5.903	48.871	3.533	7.032***	72.102
ESG_index	0.588	0.172	0.222	0.556	1.000	0.930	0.117	0.464	0.176	0.454***	14.092
Intro	0.024	0.144	0.000	0.000	0.000	0.010	0.130	0.020	0.162	0.009***	3.617
Growth	0.418	0.350	0.000	0.000	1.000	0.280	0.443	0.318	0.461	0.027***	4.381
Maturity	0.464	0.383	0.000	1.000	1.000	0.581	0.480	0.535	0.487	0.037***	5.209
Shake-out/ decline	0.083	0.181	0.000	0.000	0.000	0.083	0.281	0.083	0.281	0.000	0.027
Panel C: Control variables											
RETA	0.135	1.208	0.000	0.117	0.325	0.170	1.246	0.088	1.367	0.078***	3.346
LEV	0.226	0.101	0.053	0.107	0.243	0.248	0.205	0.201	0.285	0.277***	7.101
CFTA	0.040	0.111	0.009	0.044	0.087	0.041	0.110	0.042	0.112	0.003	1.165
CAPEX	-0.043	0.052	-0.056	-0.024	-0.017	-0.044	0.045	-0.041	0.056	0.003**	2.363
MTB	4.343	6.176	1.420	2.208	3.646	4.641	6.831	4.181	5.272	0.450	0.938
Div_Dum	0.504	0.478	0.000	1.000	1.000	0.664	0.457	0.587	0.488	0.155***	18.761
ROA	5.542	11.042	2.442	5.461	8.421	5.805	11.450	5.301	10.695	0.577***	2.845
R&D	0.023	0.062	0.000	0.002	0.037	0.020	0.068	0.022	0.052	-0.004***	-2.396
Size	3.264	0.610	2.750	3.223	3.739	3.570	0.768	3.080	0.512	0.478***	39.320
Firm_age	23.624	23.491	10.000	18.000	32.000	32.768	28.095	22.470	20.674	7.307***	13.718

*Note: This table presents the descriptive statistics on the full sample and subsamples of high and low ESG disclosure. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Table 1.*

Table 2, Panel B, provides a summary of the information regarding ESG disclosure and the life cycle of the company. We discover an average of 18.278 ESG disclosure score, 19.632 E_score, 17.471 S_score, and 51.164 G_score based on the whole sample, while the ESG disclosure index reveals an average disclosure of 0.69. All of the ESG-related variables have higher averages in the subsamples with high ESG disclosure compared to the subsamples with low ESG disclosure, and the mean differences are significant at the 1% level. Based on the results of our sample, the mature stage of the firm life-cycle has the biggest percentage of businesses (46.4%), followed by the growth stage (41.8%) and the shake-out/decline stage (8.3%), with just 2.4% of businesses being in the introduction stage.

The subsamples provide information on the percentage of companies that have a high or low level of ESG disclosure (for example, introduction: 2% vs 1.0%; growth: 31.8% compared to 28%). Except for the shake-out and decline stage, the difference in mean comparisons across the firm life-cycle phases is significant at the 1% level of significance.

In accordance with the findings of previous research (Cheng et al., 2014), we make use of Refinitiv Eikon's ESG disclosure score as an overarching metric in order to evaluate the company's ESG disclosure. The ESG disclosure score may vary from 0.1 to 100, with higher scores suggesting more openness and disclosure. In our further study, we additionally make use of the individual scores of environmental (E), social (S), and governance (G) disclosures. These scores indicate the level of information that the company discloses for each category. For example, environmental scores are based on firm disclosure on climate change policies, hazardous wastes, nuclear energy, and sustainability indicators, among other things; social scores are based on consumer protections, diversity, human rights, animal rights, welfare, child labor, and employee health and safety indicators; and governance scores are based on management structure, diversity, executive compensation, and other things. In addition to this, we search the Refinitiv Eikon databases ESG disclosure data set for companies that are included in the collection but do not offer information (E, S, or G ratings) on the three variables. After that, we make use of an ESG disclosure index with a value ranging from 0 to 1, which is determined by the typical amount of disclosure that occurs about ESG disclosure ratings.

We employ the proxies developed by Dickinson (2011) and DeAngelo et al. (2006) to measure the firm life cycle. Both sets of proxies have a long history of use in the academic community (Faff et al., 2016). Our cash flow patterned-based categorization of companies into life-cycle phases is congruent with the theory. This classification is mostly based on Dickinson (2011). In particular, we categorize businesses into one of four phases: introduction, growth, maturity, and shake-out or decline. These stages are determined by the following patterns of net cash flow from operating (ONCF), investing (INCF), and financing (FNCF) activities.

In addition to this, we make use of the life-cycle proxy of retained earnings to total assets ratio (*RETA*) that was created by DeAngelo et al. (2006). This ratio determines whether a company is more dependent on external funds or internal liquidity. According to DeAngelo et al. (2006), *RETA* is a strong proxy for a company's life cycle due to the fact that it is composed of equity, as well as external funding. A *RETA* that is greater (lower) than normal indicates that the company is mature (young and growing), as a consequence of the accumulation of profits through time and investment activities. This may be contrasted with a *RETA* that is below average (DeAngelo et al., 2006). We make use of a code variable that is given the value 1 if a company has a high *RETA* and the value 0 otherwise. We utilize the connection between ESG disclosure, which serves as an umbrella measure, and the various phases of a company's life cycle in order to highlight the influence that ESG disclosure has on cash holdings.

In order to investigate the probability of a multicollinearity issue, the correlations that exist between the variables in our regression model are detailed in Table 3. The strongest relationships may be seen between the ESG disclosure score and each of the component scores, E_score, S_score, and G_score (0.9, 0.8, and 0.7, respectively). The individual scores on the E, the S, and the G also show a substantial association. A typical rule of thumb is that a correlation that is more than 0.7 may indicate that there is an issue with multicollinearity (AlHares, Ntim, Al-Hares, et al., 2018). Because we employ highly correlated variables in distinct regressions rather than concurrently in the model, the correlations between these variables do not pose a problem for our research. Rather than include them all together in the model. There is not a single correlation coefficient value that is more than 0.7 for any of the other variables. In addition, we compute the variance inflation factor (VIF) and discover that it is less than 3.4, while the total mean value is 3.4; this suggests that multicollinearity is not a problem in the phases of the model cycle.

We tested the relation using the following model and estimation method (Eq. (1)). Then, we use a modified baseline regression model (Eq. (2)) to test our hypothesis:

Model 1

$$Ratio\_of\_cash_{it} = \alpha + \beta_1(ESG)_{it} + \delta_2(Z)_{it} + \delta_3 \sum(Industry\ effects)_i + \delta_4 \sum(Year\ effects)_t + \varepsilon_{it} \quad (1)$$

Model 2

$$Ratio\_of\_cash_{it} = \alpha + \beta_1(ESG)_{it} + \beta_2(FLC)_{it} + \delta_3 \sum(ESGxFLC)_i + \delta_4(Z)_{it} + \delta_5 \sum(Industry\ effects)_i + \delta_6 \sum(Year\ effects)_t + \varepsilon_{it} \quad (2)$$

Table 3. Correlation matrix

	(1) Ratio_of_cash	(2) ESG_score	(3) E_score	(4) S_score	(5) G_score	(6) Intro	(7) Growth	(8) Maturity	(9) Shake-out/decline	(10) RETA	(11) LEV	(12) CFTA	(13) CAPEX	(14) MTB	(15) Div_Dum	(16) ROA	(17) R&D	(18) Size	(19) Firm_age
1	1.000																		
2	-0.008	1.000																	
3	-0.002	0.962	1.000																
4	-0.023	0.845	0.734	1.000															
5	-0.051	0.733	0.652	0.622	1.000														
6	0.017	-0.026	-0.024	-0.045	-0.006	1.000													
7	-0.088	-0.116	-0.125	-0.076	-0.052	-0.053	1.000												
8	0.016	0.113	0.113	0.064	0.044	-0.131	-0.012	1.000											
9	0.125	0.027	0.013	0.017	0.003	-0.022	-0.154	-0.385	1.000										
10	0.003	0.044	0.047	0.026	0.043	-0.041	-0.056	0.054	0.003	1.000									
11	-0.335	0.028	0.022	0.054	0.057	0.072	0.198	-0.178	0.012	-0.057	1.000								
12	0.422	0.131	0.132	0.034	0.028	-0.232	-0.356	0.377	-0.041	0.114	-0.333	1.000							
13	0.228	0.056	0.074	0.021	-0.013	0.013	-0.243	0.143	0.125	0.001	-0.051	0.486	1.000						
14	0.024	0.047	0.044	0.013	0.033	0.003	-0.038	0.044	-0.008	0.002	0.107	0.087	0.012	1.000					
15	-0.185	0.177	0.133	0.162	0.193	-0.053	-0.072	0.111	-0.006	0.115	0.072	-0.033	0.005	0.013	1.000				
16	0.256	0.092	0.095	0.046	0.047	-0.142	-0.166	0.201	-0.022	0.144	-0.302	0.584	0.088	0.072	0.016	1.000			
17	0.371	0.125	0.162	0.035	0.045	0.094	-0.114	0.035	0.084	-0.091	-0.223	0.366	0.203	0.014	-0.238	0.173	1.000		
18	-0.223	0.463	0.447	0.411	0.422	-0.053	0.013	-0.002	-0.002	0.022	0.133	-0.065	-0.021	-0.001	0.227	-0.031	-0.056	1.000	
19	-0.118	0.127	0.128	0.063	0.081	-0.017	-0.051	0.045	0.013	0.091	0.057	0.033	0.071	-0.011	0.222	0.025	-0.037	0.114	1.000

Note: The table presents the correlation matrix among all the variables used in this study. Bold coefficients show high correlations. All variables are defined in Table 1.

Similar to what was done in earlier research, we start by examining the general relationship between cash holdings and ESG disclosure. Then, in order to test our hypothesis, we will utilize a baseline regression model that has been adjusted where we quantify the ratio of cash (in both models) as cash and marketable securities to net assets, and net assets are defined as the book value of total assets minus cash and marketable securities. In other words, we subtract cash and marketable securities from total assets to get net assets. In both models, ESG disclosure refers to the score that may range anywhere from 0.1 to 100 (provided by Refinitiv Eikon databases). In keeping with the findings of previous research (Faff et al., 2016), we employ *FLC* (in Model 2) to represent the several phases of the firm's life cycle (introduction, growth, maturity, and shake-out/decline). Principles for responsible investment in each of these models, the control variables that are represented by the vector Z are *LEV, CFTA, CAPEX,* and *MTB*. The impacts of the industry are determined by the two-digit code of the Global Industry Classification Standards (GICS), whereas the effects of the year are determined by the sample year (2012–2021).

Table 4. The effect of ESG disclosure on cash holdings

Variable	*Panel A*			*Panel B*			*Panel C*		
	(1) OLS	*(2) OLS*	*(3) Lagged*	*(4) OLS*	*(5) OLS*	*(6) Lagged*	*(7) OLS*	*(8) OLS*	*(9) OLS*
ESG_score	-0.003***	-0.002***	-0.002**	-	-	-	-	-	-
	(-15.25)	(-2.63)	(-2.17)						
ESG_index	-	-	-	-0.124***	-0.006**	-0.016*	-	-	-
				(-14.04)	(-2.14)	(-1.72)			
E_score	-	-	-	-	-	-	-0.002*	-	-
							(-1.80)		
S_score	-	-	-	-	-	-	-	-0.003***	-
								(-2.30)	
G_score	-	-	-	-	-	-	-	-	-0.001***
									(-2.73)
RETA	-	-0.003*	-0.000	-	-0.003	-0.001	0.003	-0.005***	-0.003*
		(-1.77)	(-0.03)		(-0.86)	(-0.02)	(0.27)	(-4.05)	(-1.78)
LEV	-	-0.142***	-0.027	-	-0.144***	-0.024	-0.103***	-0.112***	-0.141***
		(-8.03)	(-1.58)		(-8.13)	(-1.38)	(-8.18)	(-8.07)	(-8.18)
CFTA	-	0.074	-0.047	-	0.070	-0.035	0.224***	0.215***	0.064
		(1.52)	(-0.74)		(0.40)	(-0.68)	(5.85)	(5.47)	(1.51)
CAPEX	-	0.221***	-0.040	-	0.112**	-0.049	0.152***	0.284***	0.218***
		(3.62)	(-0.60)		(2.17)	(-0.69)	(3.18)	(5.07)	(3.57)
MTB	-	0.000**	-0.000	-	0.000***	-0.000	0.002*	0.002	0.000**
		(2.05)	(-0.18)		(3.36)	(-0.06)	(1.60)	(1.14)	(2.06)
Div_Dum	-	-0.000	-0.016**	-	0.000	-0.016	-0.006	-0.001	-0.000
		(-0.07)	(-2.01)		(0.003)	(-2.02)	(-1.35)	(-0.17)	(-0.05)
ROA	-	-0.001***	0.000	-	-0.002	0.001	0.002***	0.002***	-0.001***
		(-3.37)	(0.09)		(-0.72)	(0.06)	(3.68)	(4.06)	(-3.32)
R&D	-	1.447***	-0.217***	-	1.460***	-0.205***	0.443***	0.717***	1.445***
		(23.52)	(-3.03)		(3.35)	(-2.87)	(7.67)	(14.14)	(23.71)
Size	-	-0.054***	-0.018***	-	-0.058***	-0.016***	-0.021***	-0.043***	-0.053***
		(-11.56)	(-4.41)		(-10.21)	(-4.12)	(-8.51)	(-12.89)	(-12.03)
Firm_age	-	-0.000***	0.000	-	-0.000***	0.001	-0.001***	-0.000***	-0.000***
		(-4.07)	(0.03)		(-6.21)	(0.05)	(-4.75)	(-3.76)	(-4.06)
Constant	0.182***	0.357***	0.176***	0.230***	0.342***	0.182***	0.203***	0.307***	0.311***
	(38.21)	(11.06)	(3.86)	(27.86)	(12.38)	(4.07)	(7.03)	(11.41)	(7.65)
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	750	750	750	750	750	750	750	750	750
Adj.R^2	0.122	0.217	0.181	0.110	0.216	0.182	0.334	0.275	0.216

*Note: This table presents the regression results where ESG disclosure is measured by a score ranging from 0 to 100. Panel A presents the results when cash holdings are measured by the ratio of cash and cash equivalents to net assets using OLS and 1-year lagged control variables. Panel B presents the results when ESG disclosure is measured as the extent of disclosure ranging from 0 to 1 using OLS and 1-year lagged variables. Panel C presents the results with individual ESG scores (E, S, and G) using OLS. OLS method employs the regression while controlling for industry and year effects. The 1-year lagged control variables employ the industry- and year- effect estimations where contemporaneous variables are replaced by lagged variables in the regression model. The coefficients are reported at 1%, 5%, and 10% levels of significance with ***,**, and *, respectively. Dependent variable: Ratio_of_cash.*

In the first step of our analysis, we investigate how the ESG disclosure (ESG score) affects the cash reserves of companies and give the findings of the OLS regression in Table 4. The first step in our study involves doing a regression on the relationship between cash holdings (ratio of cash) and ESG disclosure (ESG score). In column 1 (which does not include any control variables), we see a link that is substantially negative, in addition to year-fixed and industry-fixed effects. In columns 2 and 3, respectively, you will find control variables that are contemporaneous with the current time, as well as those that are one year in the past (t - 1). The ESG disclosure score (ESG score) has a considerably negative influence on cash holdings (at the 5% or greater level) across all of the criteria that are included in Panel A. For example, if there is a rise of one point in the ESG disclosure, there will be a reduction of 0.20% in cash holdings, as indicated in column 2. The fact that ESG disclosure has been shown to have a negative effect on cash holdings, which has been shown to be consistent and

statistically robust evidence, demonstrates that ESG disclosure offers a powerful governance mechanism and helps decrease the agency issue.

We estimate the baseline by using ordinary least squares (OLS) with fixed effects for both the industry and the year. In addition to this, we switch out the contemporaneous variables with controls that are behind by one year (t - 1). The reasoning for this is that it may take some time for ESG disclosure and firm-level features to have an effect on the choices that a company makes about its cash holdings. In order to account for heteroscedasticity, we adjust the standard errors of the residuals to account for any clustering that may occur at the firm level (Petersen, 2009).

Table 5. The effect of ESG disclosure on cash holdings: A life-cycle perspective

Panel A	***(1) OLS***	***(2) Lagged***	***(3) OLS***	***(4) Lagged***
Intro	0.002* (1.71)	0.002* (1.71)	-	-
Growth	0.012*** (3.21)	0.034*** (2.35)	-	-
Maturity	-0.022*** (-5.66)	-0.037*** (-3.26)	-	-
Shake-out/decline	0.046*** (2.81)	0.045*** (2.62)	-	-
High_RETA	-	-	-0.023*** (-3.11)	-0.022*** (-2.28)
RETA	-0.004 (-1.33)	-0.008 (-2.42)	-	-
LEV	-0.248*** (-9.51)	-0.156*** (-9.63)	-0.152*** (-8.78)	-0.145*** (-9.33)
CFTA	0.117 (2.87)	0.113 (1.22)	0.124*** (2.43)	0.131 (1.22)
CAPEX	0.113*** (2.63)	0.208*** (2.61)	0.317*** (3.35)	0.143* (1.55)
MTB	0.004*** (4.21)	0.004*** (3.45)	0.003*** (2.11)	0.002*** (3.55)
Div_Dum	-0.002 (-0.25)	0.003 (0.15)	-0.002 (-0.02)	-0.004 (-0.18)
ROA	-0.022 (-0.12)	-0.008 (-0.18)	-0.013 (-0.52)	-0.023 (-0.17)
R&D	1.144*** (3.77)	1.352*** (3.76)	1.264*** (22.86)	1.208*** (3.48)
Size	-0.047*** (-15.67)	-0.048*** (-13.48)	-0.046*** (-13.46)	-0.046*** (-13.18)
Firm_age	-0.019*** (-6.33)	-0.033*** (-6.33)	-0.016*** (-3.84)	-0.021*** (-7.75)
Constant	-	-	0.282*** (13.11)	0.232*** (11.84)
Indusrty effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
N	750	750	750	750
Adj.R^2	0.223	0.215	0.208	0.213
Panel B	***(1) OLS***	***(2) Lagged***	***(3) OLS***	***(4) Lagged***
ESG_score	0.002*** (2.15)	0.002*** (3.31)	0.004 (0.86)	0.003*** (2.62)
Intro	0.042*** (2.51)	0.038*** (2.32)	-	-
Intro x ESG_score	-0.004*** (-2.65)	-0.008*** (-2.28)	-	-
Growth	0.009 (1.37)	0.018 (1.19)	-	-
Growth x ESG_score	-0.002*** (-2.07)	-0.001*** (-2.33)	-	-
Maturity	-0.038*** (-3.46)	-0.042*** (-2.06)	-	-
Maturity x ESG_score	0.001 (1.32)	0.002 (1.56)	-	-
Shake-out/decline	0.035*** (2.47)	0.038*** (2.25)	-	-
Shake-out/decline x ESG_score	-0.005*** (-2.26)	-0.002*** (-2.01)	-	-
High_RETA	-	-	-0.016 (-1.28)	-0.028 (-2.22)
High_RETA x ESG_score	-	-	0.003* (1.78)	0.004* (1.94)
RETA	-0.003* (-1.66)	-0.004 (-0.88)	-	-
LEV	-0.148*** (-8.26)	-0.145*** (-9.07)	-0.143*** (-8.38)	-0.238*** (-7.77)
CFTA	0.122*** (2.55)	0.082 (0.44)	0.064 (0.36)	0.222*** (2.03)
CAPEX	0.101*** (3.22)	0.131*** (2.41)	0.228*** (3.25)	0.186*** (3.88)
MTB	0.006*** (2.05)	0.007*** (3.28)	0.012*** (4.22)	0.022*** (2.02)
Div_Dum	0.001 (0.15)	0.002 (0.16)	0.001 (0.02)	-0.003 (-0.18)
ROA	-0.001*** (-3.56)	-0.002 (-0.82)	-0.002 (-0.68)	-0.003*** (-3.71)
R&D	1.222*** (22.12)	1.334*** (3.32)	1.333*** (3.25)	1.408*** (20.22)
Size	-0.055*** (-11.44)	-0.056*** (-10.16)	-0.054*** (-12.11)	-0.044*** (-11.35)
Firm_age	-0.027*** (-3.86)	-0.021*** (-6.36)	-0.022*** (-4.27)	-0.016*** (-4.25)
Constant	-	-	0.467*** (13.11)	0.254*** (9.34)
Indusry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
N	750	750	750	750
Adj.R^2	0.224	0.218	0.217	0.220

Note: This table presents the regression results of Model 2. Dependent variable: Ratio_of_cash.

After determining that there is a negative correlation between ESG disclosure and cash on hand, the next step is to analyze the nature of this correlation at different points in the life cycle of a company. We employ contemporaneous data, as well as variables that are one year behind schedule in columns 1 and 2, respectively, in order to investigate the relationship between cash holdings and life-cycle phases (a vector of dummy variables based on Dickinson, 2011). The amount of cash held at each step of the life cycle is shown in Panel A of Table 5, which can be seen here. The cash holdings are positive and substantial in both the introduction and development phases of the business when they reach 10% or above in both columns. It is possible that frequent future investments, variable cash flows, a less solid client base, and restricted access to the capital market are all factors that contribute to substantial cash holdings in young (introduction and growth) companies (Barclay & Smith, 2005). These results are congruent with those found in the aforementioned literature (Faff et al., 2016). It is consistent with Faff et al. (2016) that the maturity stage has negative cash holdings (at the 1% level),

which indicates predictable cash flows and fewer financing needs as a result of established corporate governance. However, contrary to the results of Faff et al. (2016), the shake-out/decline stage exhibits positive and considerable (at the 1% level) cash holdings (columns 1 and 2). This is the case despite the fact that investment possibilities are limited and cash flow has decreased. In general, these data point to larger cash holdings across the board of the life-cycle phases, with the exception of maturity. We also compute cash holdings over the life-cycle phases based on DeAngelo et al. (2006) by utilizing a dummy variable called *RETA*, and we find that our findings are consistent in columns 3 and 4. This is a robustness check.

After that, we utilize the ESG disclosure index, which is a variable that ranges from 0 to 1 depending on the typical amount of ESG disclosure, as an independent variable in Panel B, so that we can assess the robustness of our findings. As we did in Panel A, we do a regression of cash holdings on the ESG disclosure index, but this time we employ no controls in column 4, contemporaneous controls in column 5, and 1-year-lagged controls (t - 1) in column 6. All of the models in Panel B point to the conclusion that the amount of ESG disclosure (ESG index) has a considerably detrimental effect on cash holdings (at a level of 10% or more). In addition to this, in Panel C we do a regress on cash holdings based on each individual ESG element (E score, S score, and G score) (columns 7–9). These individual scores have a negative influence on cash holdings as well (which becomes significantly negative at the 10% or greater level). Our results, which are in accordance with the research that was done in the past, imply that increasing the amount of ESG disclosure helps to reduce the agency issue by strengthening internal and external monitoring.

The robustness of our findings is put to the test in this part via the use of a battery of sensitivity assessments. To begin, we will utilize a few different definitions to talk about cash holdings (our dependent variable of interest). In place of the ratio of cash, we make use of the ratio of cash and cash equivalents to total assets, the cash holdings normalized by the industry average, and the natural logarithm of the cash holdings. Second, we investigate the influence of ESG score and ESG index on a variety of proxies for cash holdings by using a distinct approach to estimate these relationships. Third, we follow the methodology of previous research and adjust for other corporate governance factors that may impact the policies and choices of corporations regarding cash holdings. In particular, we focus on board size (which is quantified as the total number of directors), board independence (which is quantified as the proportion of independent directors), and CEO duality (a dummy variable is equal to 1 if CEO is the chairman of the board and 0 otherwise). In conclusion, we make use of the tobit regression all the way through the life-cycle phases in order to investigate the influence of ESG disclosure on cash holdings (Panel E).

Table 6. Sensitivity analysis

Variable	*(1)* *Ratio_of_cash*	*(2)* *Cashta*	*(3)* *Cash (industry adj.)*	*(4)* *Ln_cash*
Panel A				
OLS regression (N = 750)				
ESG_score	-0.002*** (-1.63)	-0.003** (-1.96)	-0.001** (-1.96)	-0.003*** (-3.71)
Controls	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Panel B				
OLS regression (N = 750)				
ESG_index	-0.016** (-1.98)	-0.003** (-1.87)	-0.002** (-1.88)	-0.034* (-1.71)
Controls	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Panel C				
Tobit regression (N = 750)				
ESG_score	-0.006*** (-2.64)	-0.002* (-1.74)	-0.003** (-2.03)	-0.003*** (-3.05)
Controls	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Panel D				
Controlling for board variables, i.e., the board size, board independence, CEO duality (N = 750)				
ESG_score	-0.003** (-2.11)	-0.002** (-2.22)	-0.005*** (-3.09)	-0.015** (-2.18)
Controls	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Panel E				
Tobit regression (N = 750)				
FLC	0.009*** (3.86)	0.003** (2.14)	-0.047*** (-2.88)	0.023*** (2.71)
Intro x ESG_score	-0.004*** (-2.66)	-0.006* (-1.86)	0.006 (1.56)	-0.017** (-2.85)
Growth x ESG_score	-0.001** (-2.06)	-0.003** (-2.22)	-0.013* (-1.866)	-0.003** (-2.16)
Maturity x ESG_score	0.006 (1.36)	-0.008 (1.56)	0.013* (1.78)	-0.006 (-1.42)
Shake-out/decline x ESG_score	-0.005** (-2.08)	-0.004** (-2.18)	-0.004* (-1.76)	-0.007** (-2.01)
Controls	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes

*Note: This table presents the results of sensitivity analysis using alternative variables, alternative methods, and additional control variables in five panels (A–E). Industry and year effects are included in all the regressions. The robust t-statistic of each coefficient is shown in parentheses. All variables are defined in Table 1. Coefficients are reported at 1%, 5%, and 10% levels of significance with ***, **, and *, respectively.*

The findings are shown in Table 6, Panels A–E, with column 1 in Panel A replicating the OLS regression that was performed in Table 4, but using each unique measure for the dependent variable of interest. Nevertheless, the regression in column 1 is the same as the regressions in columns 2 and 5 of Table 4, as can be seen in Panels A and B. We are able to verify the negative impact of ESG disclosure (ESG score) on cash holdings (significant at the 5% or greater level) when we utilize a number of different metrics of cash holdings in Panel A. Panel B substantiates the hypothesis that ESG index, an alternative measure of ESG transparency, has a negative influence on cash holdings (significant at the 10% or greater level). When the tobit regressions are used, Panel C similarly demonstrates a negative influence across all of the columns at a level of significance of 10% or above. Even when board features were controlled for, Panel D indicates that the findings were constant.

Because there is a problem with causation, our baseline findings could be susceptible to endogeneity bias. It is conceivable for there to be a relationship between company-level governance and the occurrence of ESG disclosure at the firm level or vice versa. For instance, managers that react to shareholders' requests for smaller cash holdings may also respond to external concerns about ESG disclosure, which would bias our findings in that direction. We apply two different econometric techniques — namely, the propensity score matching (PSM) and the two-stage least squares (2SLS) — in order to rule out the possibility of endogeneity.

First, we look at PSM to determine whether or not two comparable businesses are likely to continue the same path in the absence of any therapy. In the event of treatment, the effect should be indicated in the difference between the changes in the two companies (Roberts & Whited, 2012).

We carry out a two-step PSM in order to analyze the alterations in cash holdings of two groups of companies that have comparable features but vary in terms of the ESG transparency they provide. Following the lead of previous research (Brogaard et al., 2017), we ranked the number of years an organization had spent disclosing ESG information. We then created a treatment group to compare to a control group and kept the companies that ranked in the top and bottom terciles. Then, we create a dummy variable called ESG tercile, which has a value of 1 if a company is in the treated group's top tercile and a value of 0 if it is in the untreated group's bottom tercile. The treatment (control) group is comprised of companies that have the greatest (lowest) level of ESG disclosure.

In the first stage, we will begin by doing the logit regression analysis for the ESG tercile variable using all of our explanatory factors as shown in Eq. (1). Propensity ratings are calculated for each firm-year observation based on the estimated outcomes of the logit regression model. The results of the logit regression performed on Panel A are shown in Table 7. According to the findings, it seems that companies with a greater level of ESG disclosure include those that are older, bigger, have lower debt, pay higher dividends, and have more R&D spending. The value of the pseudo-R^2 for this is rather high (47.7%).

Table 7. Propensity score matching

Panel A				
Variable	***Pre-match***		***Post-match***	
	ESG_tercile			
RETA	-0.003 (-0.14)		0.045 (1.56)	
LEV	-0.666** (-2.32)		-0.415 (-1.68)	
CFTA	7.439*** (7.80)		4.322 (1.67)	
CAPEX	-4.829*** (-4.45)		-1.151 (-1.19)	
MTB	0.002 (0.42)		0.001 (0.41)	
Div_Dum	0.535*** (4.81)		-0.140 (-1.30)	
ROA	0.013* (1.78)		-0.010 (-1.34)	
R&D	11.132*** (7.76)		8.663* (1.75)	
Size	3.508*** (32.38)		0.483* (1.78)	
Firm_age	0.004*** (2.65)		0.009* (1.76)	
Constant	-14.865*** (-25.47)		-1.662*** (-3.65)	
Industry effects	Yes		Yes	
Year effects	Yes		Yes	
N	750		750	
Pseudo-R^2	0.477		0.142	
Panel B: Difference in firm characteristics				
Variable	***Treatment***	***Control***	***Difference***	***t-stat***
RETA	0.278	0.232	0.048	1.722
LEV	0.237	0.216	0.010	1.188
CFTA	0.058	0.047	0.003	0.608
CAPEX	-0.041	-0.040	-0.002	-0.478
MTB	5.274	4.477	0.786	0.988
Div_Dum	0.737	0.674	0.052	1.828
ROA	6.232	6.484	-0.241	-1.408
R&D	0.011	0.020	0.002	0.388
Size	3.779	3.787	-0.007	-1.338
Firm_age	37.157	33.08	3.967	1.145
Panel C: Propensity score estimator				
Variable	***Treatment***	***Control***	***Difference***	***t_stat***
Ratio_of_cash	0.088	0.118	-0.028***	-11.348

*Note: This table presents the results of the propensity score matching in three panels. Panel A shows the pre- and post-sample results, Panel B presents the differences in firm characteristics for the matched sample and Panel C shows the propensity score matching estimator. Robust t-statistics are shown in parentheses. All variables are defined in Table 1. Coefficients are reported at 1%, 5%, and 10% levels of significance with ***, **, and *, respectively.*

In the second phase, we utilize the propensity scores to build one-to-one matched pairings. This helps us make sure that the companies that have a greater level of ESG disclosure (the treatment group) are sufficiently comparable to the companies that have a lower level of ESG disclosure (the control group). To be more specific, every firm-year that had a greater level of ESG disclosure was paired with a firm-year that had a lower level of disclosure by using the propensity score that was the most similar. We employ matching with replacement, and we demand that the absolute value of the difference in the propensity scores of the businesses in the treatment group and the firms in the matching group be less than 0.1%. With the use of these criteria, we were able to efficiently match 750 firm-year data; hence, our treatment and control groups are essentially comparable, along with all explanatory variables with the exception of ESG disclosure.

Table 8. Two-stage least squares

Variable	*First-stage (1) ESG_score*	*Second-stage (2) Ratio_of_cash*
Industry	0.028** (2.08)	-
ESG_score-fitted	-	-0.002*** (-3.13)
RETA	0.227 (0.82)	-0.003** (-2.97)
LEV	1.319** (2.18)	-0.155*** (-9.11)
CFTA	-2.886 (-4.95)	0.107*** (2.51)
CAPEX	-7.083*** (-10.01)	0.214*** (3.70)
MTB	-0.001 (0.77)	0.002** (2.21)
Div_Dum	1.137*** (16.15)	-0.008 (-1.31)
ROA	-0.003 (-0.86)	-0.002*** (-3.68)
R&D	-3.585 (-5.28)	1.459*** (26.58)
Size	1.141*** (16.11)	-0.056*** (-11.07)
Firm_age	0.005*** (5.67)	-0.003*** (-4.80)
Constant	2.002*** (2.211)	0.273*** (21.58)
Industry effects	No	No
Year effects	Yes	Yes
N	750	750
Model fits		
F-statistics	69.42*** [0.00]	
Cragg-Donald Wald F-statistics	71.03	
Stock-Yogo ID test critical values at 10% IV size	15.27	

*Note: This table presents the results of the 2SLS. Column 1 reports the first-stage regression, and column 2 shows the second-stage regression results. The robust t-statistic of each coefficient is shown in parentheses. All variables are defined in Table 1. Coefficients are reported at 1%, 5%, and 10% levels of significance with ***, **, and *, respectively.*

In the first column of Table 8, you will see the results of an initial step of regression that used the ESG score as the dependent variable. The IV size, in addition to the controls that were used in the first equation, is one of the explanatory variables. As has been demonstrated, the coefficient on industry (ESG) is statistically significant at the 5% level, which suggests that the IV is legitimate due to its relevance and its statistical capacity to explain the ESG score. Further evidence that IV is not lacking is provided by the high value (69.42) of the F-statistic. In addition, the Cragg–Donald Wald F weak-instrument test has a p-value of 0.000, which means that the null hypothesis that the instrument is weak cannot be supported (Cragg & Donald, 1993). In the second stage of our regression analysis, we regressed ESG score-fitted on cash holdings in addition to other factors. The findings of this step are shown in column 2 of Table 8. Our findings coincide with the predictions made by our primary model: Greater ESG disclosure is associated with less cash on hand, as seen by the negative value of the coefficient on the ESG score-fitted variable, which is a statistically significant finding. Therefore, after reducing the impact of endogeneity issues, we may confidently deduce that ESG disclosure leads to a decrease in cash holdings.

Table 9. The effect of ESG disclosure on firm performance and value of cash holdings (Part 1)

Variable	*Tobin's Q*	*ROS*	*Excess return*
ESG_score	0.003** (2.05)	0.004** (2.03)	0.002** (2.07)
Ratio_of_cash	-0.003* (-1.78)	-0.002* (-1.77)	-0.002 (-1.23)
Δratio_of_cash	-	-	0.003 (1.18)
Intro	0.026* (1.80)	0.011* (1.78)	0.010** (2.22)
Intro x ESG_score x ratio_of_cash	0.013*** (2.22)	0.009*** (2.38)	-
Intro x ESG_score x Δratio_of_cash	-	-	0.007** (2.05)
Growth	0.023** (2.04)	0.026** (2.04)	0.003** (2.06)
Growth x ESG_score x ratio_of_cash	0.007** (2.16)	0.009* (2.22)	-
Growth x ESG_score x Δratio_of_cash	-	-	0.008** (2.03)
Maturity	-0.028** (-2.22)	-0.012 (-1.33)	1.002 (0.13)
Maturity x ESG_score x ratio_of_cash	0.038 (1.22)	0.001 (1.25)	-
Maturity x ESG_score x Δratio_of_cash	-	-	0.025 (1.01)
Shake-out/decline	-0.013* *(-1.77)	-0.018** (-2.05)	0.018 (1.09)
Shake-out/decline x ESG_score x ratio_of_cash	0.003* (1.80)	0.006* (1.77)	-
Shake-out/decline x ESG_score x Δratio_of_cash	-	-	0.002** (2.19)

Table 9. The effect of ESG disclosure on firm performance and value of cash holdings (Part 2)

Variable	*Tobin's Q*	*ROS*	*Excess return*
RETA	-0.006* (-1.87)	-0.011* (-1.88)	0.013** (2.18)
LEV	-0.133** (-2.06)	-0.122** (-2.03)	-0.181* (-1.83)
CFTA	0.124** (2.09)	0.102** (2.04)	0.087** (2.22)
CAPEX	0.180*** (2.88)	0.126** (2.03)	0.087* (1.73)
MTB	0.008** (2.03)	0.005** (2.02)	0.008** (2.08)
Div_Dum	0.003 (1.11)	0.004 (1.12)	0.002 (0.83)
R&D	1.127** (2.18)	1.181** (2.01)	0.292** (2.07)
Size	0.042*** (3.04)	0.012*** (2.32)	0.022*** (2.54)
Firm_age	0.011*** (2.36)	0.011*** (2.56)	0.014** (2.06)
LEV x $\Delta ratio\_of\_cash_{t-1}$	-	-	0.004* (1.84)
Ratio_of_cash x $\Delta ratio\_of\_cash_{t-1}$	-	-	0.006** (2.08)
Constant	0.332*** (4.03)	0.328*** (5.02)	0.223*** (3.12)
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
N	750	750	750
Adj.R^2	0.221	0.291	0.202

*Note: This table presents the results of the effect of ESG disclosure, cash holdings, and firm life cycle (interaction term) on firm performance measured by Tobin's Q and ROS as dependent variables (columns 1 and 2) and the value of cash holdings (column 3). Industry and year effects are included in all the regressions. The robust t-statistic of each coefficient is shown in parentheses. All variables are defined in Table 1. Coefficients are reported at 1%, 5%, and 10% levels of significance with ***, **, and *, respectively. Dependent variable: FPERF.*

In Table 9, the results of analyzing the data using OLS for *Tobin's Q* and *ROS*, respectively, are shown. The interaction term demonstrates a positive influence on business performance, which is in line with the findings of previous research that point to a favorable association between the environmental and financial success of enterprises (AlHares, 2020a). Overall, we conclude that more ESG disclosure, as well as a larger level of cash holdings throughout the start-up, growth, and shake-out/decline periods all contribute to better levels of company performance.

Model 3

$$FPERF_{it} = \alpha + \beta_1(ESG)_{it} + \beta_2(FLC)_{it} + \beta_3(ratio\_of\_cash)_{it} + \delta_4(ESG\ x\ FLC\ x\ ratio\_of\_cash)_{it} + \delta_5(Z)_{it} + \delta_6 \sum(Industry\ effects)_i + \delta_7 \sum(Year\ effects)_t + \varepsilon_{it} \quad (3)$$

5. CONCLUSION

Disclosure of ESG issues has quickly become an essential component to consider when formulating investment strategies. At the same time, the allocation and usage of a company's liquid assets (cash holdings) during the course of the various stages of the life cycle merit more research. On the other hand, there is no evidence in the published research on how ESG disclosure affects cash holdings at various phases of the life cycle of a company. In this research, we investigate how cash holdings are affected by the environmental, social, and governance disclosure practices of corporations. This study contributes to the existing body of ESG disclosure research by offering empirical data on the influence of ESG disclosure on cash holdings at different periods during a company's life cycle. The study provides valuable insights into the ongoing discussion all across the world on ESG, and mainly 5 countries from the OECD which are the United States of America, Canada, the United Kingdom, Japan, and Australia, over the period 2012–2021. We find that starting cash holdings are greater in the introduction, and growth and lower in the mature, and shake-out/decline phases of the life cycle for S&P 500 companies from OECD countries, which is essentially consistent with the findings of previous research. Then, we find that ESG disclosure has a significantly negative influence on cash holdings in the introduction, growth, and shake-out/decline stages of firms, but that it has no significant effect on cash holdings in the mature stage of firms, which results in higher firm performance and a positive value of cash holdings, which is consistent with the findings of previous studies. Our findings are consistent across a wide range of robustness tests, such as those for alternative measurements, specifications, extra control variables, and endogeneity methodologies.

Our research has recommendations for policymakers, investors, and business organizations. Importantly, our study reveals how higher levels of ESG disclosure lead to better cash-holding practices. This is the consequence of robust internal and external monitoring systems, as well as the recognition of the influence of this factor at different phases of the life cycle of the organization. In spite of the fact that SEC-registered businesses in the United States include some kind of sustainability information in their regulatory filings, the fact that ESG disclosure is optional has made it more difficult for businesses to present correct information. As a crucial managerial and policy implication, therefore, regulating agencies like the Sustainability Accounting Standards Board (SASB) should consider revising disclosure policies related to ESG in order to improve the accuracy and transparency of disclosure. This would be an important step toward meeting the goals of Sustainable Development Goals. This change would enhance socially responsible and environmentally conscious corporate practices while also ensuring the availability of and the quality of ESG disclosure at the firm level for all listed companies. This will further assist to minimize the gap between the demand for ESG information by investors and the supply of information by

enterprises, as well as address concerns from investors about a lack of comparable and trustworthy sustainability information. ESG disclosure and its influence on firm-level outcomes in developed and developing nations may be the topic of future study, although this is contingent on the availability of relevant data. Despite the contributions presented above, this research has the potential limitation that should be considered and is associated with the sample collected. This research depends only on companies listed in five countries of the OECD. We believe that further research should investigate the influence of the financial services sector. Further studies may also examine firms in other regions.

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