

Efficiency as the Missing Link: Exploring How ESG Practices Shape Cash Holding Decisions

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Abstract

This study examines the relationship between environmental, social, and governance (ESG) performance and corporate cash holdings by investigating the mediating role of firm efficiency among Indonesian non-financial firms from 2018 through 2022. Using 405 firm-year observations and a mediation-based panel regression analysis, we address the ongoing debate regarding whether ESG practices reduce or increase firms' incentives to retain cash. The findings reveal that, while ESG performance does not directly affect corporate cash holdings, it significantly improves firm efficiency, and this improvement subsequently has a significant positive effect on cash holdings, indicating full mediation. Thus, ESG practices indirectly influence corporate liquidity policy by enhancing operational capability rather than solely through direct governance effects. More importantly, the positive relationship between firm efficiency and cash holdings indicates that operationally efficient firms tend to maintain large cash reserves as a form of strategic financial flexibility, so these cash reserves are not necessarily evidence of agency problems or inefficient resource allocation. In the context of emerging markets such as Indonesia's, where external financing conditions remain relatively costly and volatile, efficient firms may intentionally accumulate cash to support sustainability investments, maintain resilience, and mitigate future financing constraints. This study contributes to the ESG-finance literature by highlighting the role of firm efficiency as an important transmission mechanism linking ESG practices and corporate liquidity policy, and it also provides evidence that cash holdings in emerging markets may reflect strategic preparedness and internal financing capacity rather than managerial opportunism.

Keywords: cash holdings; ESG performance; firm efficiency; financial flexibility; emerging market.

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Introduction

Environmental, social, and governance (ESG) practices have become increasingly important in modern corporate strategy, for firms are no longer expected solely to maximize profits but are also expected to demonstrate sustainability, accountability, and responsible governance. Growing pressure from investors, regulators, and society has transformed ESG from a voluntary ethical consideration into a strategic determinant of long-term corporate resilience and financial sustainability (Li et al., 2021). Firms with strong ESG performance are generally perceived as having lower operational, reputational, and litigation risks, better stakeholder relationships, and greater access to external financing than firms with weak ESG performance (Cerqueti et al., 2021; Lins et al., 2017). Consequently, ESG practices are expected to influence not only market valuation and firm performance but also internal financial policies, particularly corporate cash holdings.

Cash holdings reflect critical financial policy decisions because they determine a firm's ability to maintain liquidity, withstand uncertainty, and finance future investments. Holding sufficient cash

enables firms to mitigate financial distress risk and maintain operational flexibility, especially during periods of economic instability, as was observed during the COVID-19 crisis (Deloitte, 2024). Nevertheless, cash holdings involve substantial trade-offs. Thus, excessive cash accumulation may reflect managerial inefficiency and agency problems arising from weak monitoring and discretionary resource allocation (Bates et al., 2009; Jensen, 1986). At the same time, maintaining adequate cash reserves may provide firms with strategic financial flexibility, thereby enabling them to finance future investments, absorb uncertainty, and support long-term sustainability initiatives (Opler et al., 1999). Therefore, firms must balance precautionary motives, investment flexibility, and efficient resource utilization when determining the optimal cash holding policies.

In this context, ESG is highly relevant to cash holding decisions because sustainability initiatives may simultaneously increase and reduce firms' incentives to retain cash. On the one hand, the implementation of ESG practices often requires substantial long-term investment in environmental innovation, stakeholder engagement, and governance systems and thus encourages firms to maintain large cash reserves to finance sustainability-related expenditures. On the other hand, firms with strong ESG performance tend to exhibit low risk exposure, strong governance quality, and access to financing, advantages with the potential to reduce the need for precautionary cash holdings (Cheng et al., 2014; Liu et al., 2023). This duality makes the relationship between ESG performance and cash holdings theoretically ambiguous and empirically challenging.

Prior empirical findings have been inconclusive. Several studies document a negative relationship between ESG practices and cash holdings and suggest that strong ESG practices reduce liquidity needs by improving governance, lowering risk, and increasing operational efficiency (Atif et al., 2022; Liu et al., 2023; Saleh et al., 2025). Other studies report a positive relationship, finding that firms with strong ESG engagement tend to maintain large cash reserves to support sustainability investments and strategic flexibility (Marie et al., 2025; Metwally et al., 2024; Yuan et al., 2025). Ho and Lu (2025) further find that corporate sustainability performance positively affects cash holdings, particularly in concentrated industries. These conflicting findings indicate that the relationship between ESG practices and cash holdings is far from straightforward and that important underlying mechanisms remain insufficiently understood.

One possible explanation for these inconsistencies is firm efficiency. Accordingly, we argue that strong ESG performance may not translate automatically into optimal cash management unless sustainability practices are effectively integrated into operational processes and resource allocation. More specifically, when firms engage in ESG disclosure symbolically, without achieving substantive improvements in operational efficiency, ESG implementation may fail to reduce liquidity needs if their utilization of corporate resources remains inefficient. By contrast, firms that successfully transform ESG initiatives into operational efficiency may experience strong operational cash flow generation and improvements in resource allocation and financial flexibility. Under such conditions, efficient firms may either reduce their precautionary cash reserves because of decreased uncertainty or increase their strategic cash reserves to support future investment opportunities and sustainability-oriented initiatives. Thus, firm efficiency may represent a critical mechanism that explains how ESG practices influence corporate cash holding policies.

This issue is particularly relevant in emerging markets, where firms often face greater financing constraints, weaker institutional environments, greater operational uncertainty, and more limited access to external capital than firms in developed economies. Under such conditions, corporate cash holdings become strategically important, as firms rely more on internal liquidity to support investment and mitigate financial risk. At the same time, ESG implementation in emerging markets remains relatively heterogeneous because of differences in governance quality, regulatory enforcement, and stakeholder pressure. Consequently, the relationships among ESG performance, operational efficiency, and cash holdings may differ substantially from those observed in developed markets.

Indonesia provides an especially relevant empirical context for examining this issue. Although 94% of listed firms published sustainability reports for the 2023 fiscal year (Bursa Efek Indonesia, 2025),

Indonesia continues to record lower average ESG scores than several of its Southeast Asian peers (Jiang et al., 2022). This situation suggests a gap in implementation performance, in that extensive ESG disclosure does not necessarily reflect effective integration of sustainability across corporate operations and financial policies. Moreover, because Indonesian firms operate in an emerging market environment characterized by relatively high financing frictions and reliance on internal funds, cash holding decisions are particularly important.

Accordingly, this study addresses three important research gaps. First, prior findings on the relationship between ESG practices and corporate cash holdings remain inconsistent. Second, the mediating role of firm efficiency as an underlying mechanism has received limited empirical investigation. Third, evidence from emerging markets, particularly Indonesia's, remains scarce despite the rapid adoption of ESG practices. Through an examination of whether firm efficiency mediates the effect of ESG practices on corporate cash holdings, this study contributes to the literature by explaining not only whether ESG practices affect corporate liquidity policy but also how and why such effects occur in the context of an emerging market economy.

Literature Review and Development of the Hypotheses

ESG scores function similarly to credit ratings; however, rather than measuring financial creditworthiness, these scores evaluate firms' ethical performance based on their ESG practices. A high score indicates strong ethical conduct across the three ESG dimensions, while a low score reflects a low priority for sustainable practices and long-term value creation. Firms with weak ESG performance may face greater exposure to future risks, particularly those arising from climate change and regulatory shifts, than firms with strong ESG performance.

Several studies have explored the key drivers of ESG adoption. Among the most significant are institutional investor pressure (Martínez-Ferrero & Lozano, 2021), the legal and regulatory environment (Simnett et al., 2009), and internal corporate governance mechanisms (Arora & Dharwadkar, 2011; Martínez-Ferrero & Lozano, 2021; Sundarasan et al., 2016). Increasingly, firms are encouraged to view ESG practices not merely as ethical obligations but as strategic tools for enhancing long-term financial resilience and competitiveness.

Wang et al. (2024) emphasize that ESG-aligned sustainability initiatives can serve as strategic resources that generate competitive advantages and improve long-term financial performance. By investing in ESG-related areas, firms can reduce operational costs and mitigate ESG-related risks (Chen et al., 2023). A strong commitment to ESG performance increases a firm's ESG score, thereby signaling responsible financial resource allocation (Tang et al., 2024).

Relationship between ESG Performance and Cash Holdings

This study draws on agency theory and stakeholder theory to explain the relationship between ESG performance and corporate cash holdings. From the perspective of agency theory, cash holdings are not maintained merely for transactional or precautionary purposes but may also reflect managerial opportunism arising from the separation between ownership and control (Jensen & Meckling, 1976). Managers often prefer to retain excessive cash reserves beyond operational needs because liquid assets increase managerial discretion and reduce dependence on external financing. Opler et al. (1999) argue that managers may intentionally accumulate cash to pursue personal objectives, avoid rigorous scrutiny from capital markets, and maintain autonomy over investment decisions. However, excess cash enables managers to engage in empire-building, overinvestment, and inefficient allocation of corporate resources, ultimately increasing agency costs and reducing firm value (Jensen, 1986).

In this context, effective governance mechanisms play a critical role in constraining managerial opportunism and disciplining cash management behavior. Firms with strong governance structures tend

to impose strict monitoring, enhance transparency, and limit managerial discretion over corporate resources. ESG practices, particularly the governance dimension, strengthen accountability and enhance the quality of oversight in a firm. High ESG scores, therefore, reflect strong governance quality and effective monitoring systems that reduce the agency conflicts associated with excessive cash accumulation (Atif et al., 2019). By improving transparency and aligning managerial decisions with shareholder interests, ESG-oriented firms become less likely to allow managers to retain excessive discretionary cash for private benefits. Consequently, firms with strong ESG performance are expected to maintain low levels of cash holdings because of reduced agency problems and efficient financial management (Atif et al., 2022).

From the perspective of stakeholder theory (Freeman, 1984), firms are responsible not only to shareholders but also to a broader set of stakeholders, including employees, customers, suppliers, creditors, regulators, and society. Firms with strong ESG performance actively cultivate trust-based relationships with these stakeholders by demonstrating ethical conduct, transparency, and long-term commitment to sustainability. Such stakeholder-oriented behavior enhances corporate reputation, strengthens stakeholder confidence, and reduces information asymmetry between firms and external capital providers.

As stakeholder trust improves, firms gain greater access to external financing at lower costs because creditors and investors perceive ESG-oriented firms to be less risky and more financially responsible than firms that are not ESG-oriented. This improved access to financing reduces firms' dependence on internal liquidity buffers and precautionary cash reserves. In other words, firms with superior ESG performance are less compelled to hold excessive cash than firms with inferior ESG performance because they can more easily obtain external funds when necessary. Furthermore, strong stakeholder relationships may stabilize cash flows and reduce operational uncertainty, thereby lowering the precautionary motive for cash retention. Therefore, stakeholder theory also predicts a negative relationship between ESG performance and cash holdings.

Taken together, agency theory and stakeholder theory suggest that strong ESG performance reduces the incentives and necessity for firms to accumulate excessive cash reserves. By improving governance quality, reducing managerial opportunism, strengthening stakeholder trust, and enhancing financing flexibility, ESG practices ultimately increase the efficiency of cash management policies. Accordingly, we propose the following hypothesis:

H1: ESG scores negatively affect cash holdings.

The Mediating Role of Firm Efficiency in the Relationship between ESG Scores and Cash Holdings

The integration of stakeholder theory, agency theory, and trade-off theory can explain the mediating role of firm efficiency in the relationship between ESG scores and corporate cash holdings. These theoretical perspectives collectively suggest that ESG practices improve firms' operational efficiency and the quality of their resource allocation, thereby influencing liquidity management decisions and reducing the need to maintain excessive cash reserves.

From the perspective of stakeholder theory, firms are expected to consider the interests of various stakeholders when conducting their business activities in order to obtain legitimacy, trust, and long-term support (Freeman & McVea, 2005). ESG disclosure reflects a firm's commitment to sustainability, transparency, and accountability toward investors, employees, customers, suppliers, regulators, and society (Liu & Tian, 2021; Tsang et al., 2023). Firms with superior ESG performance are more likely to integrate sustainability principles into operational processes and strategic decision-making than firms with inferior ESG performance. Such integration encourages firms to adopt environmentally responsible production systems, improve employee welfare and workplace safety, strengthen governance mechanisms, and optimize supply chain management (Sun et al., 2025; Xu & Wan, 2024). These practices contribute to reductions in operational inefficiencies and waste and increases in the effective utilization of corporate resources, thereby improving overall firm efficiency.

The resource-based view (RBV) further explains that ESG practices may constitute valuable organizational capabilities that enhance firms' ability to utilize resources efficiently (Barney, 1991). The integration of sustainability practices into business operations improves process management, strengthens stakeholder coordination, enhances organizational learning, and reduces resource waste. Consequently, firms with strong ESG performance are expected to convert operational inputs into financial outputs effectively, thereby increasing their operational efficiency. In addition, consistent ESG disclosure enables firms to communicate their sustainability commitments and achievements to stakeholders. Transparency strengthens stakeholder trust and investor confidence, potentially attracting broader investment participation and strategic collaborations and enabling firms to obtain low financing costs, allocate resources efficiently, and improve overall investment efficiency (Li et al., 2024).

Furthermore, firms that emphasize environmental sustainability, social responsibility, and sound governance practices tend to integrate these principles into their core business activities, leading to the productive and efficient use of corporate resources (Chang et al., 2023; Chen & Xie, 2022; Wang et al., 2025; Zhang et al., 2023). ESG performance, therefore, not only generates reputational and ethical benefits but also contributes to improved future operating performance by limiting managerial tendencies to make short-term decisions (Zhang et al., 2023). Ioannou and Serafeim (2011) further argue that sustainability reporting creates incentives for firms to strengthen relationships with employees, investors, customers, suppliers, and regulators. As a result, ESG implementation encourages firms to improve internal management practices, governance quality, and organizational processes, thereby ultimately enhancing operational efficiency.

Prior empirical studies also provide substantial evidence of the positive relationship between ESG performance and firm efficiency. Aroul et al. (2022) find that firms with strong ESG performance exhibit operational efficiency in the context of real estate investment trusts and suggest that sustainability-oriented practices contribute to effective resource utilization and operational management. Similarly, Wang et al. (2025) demonstrate that ESG positively affects operational efficiency, as firms that implement ESG practices tend to achieve economies of scale, improve process coordination, and optimize operational activities. Xie et al. (2019) further show that corporate transparency regarding ESG information is positively associated with corporate efficiency, particularly at moderate levels of disclosure. This finding suggests that balanced and meaningful ESG disclosure can enhance managerial effectiveness and operational discipline.

Agency theory and trade-off theory can explain the relationship between firm efficiency and corporate cash holdings. Agency theory suggests that managers may accumulate excessive cash holdings for personal benefit because cash is highly liquid and can be used for discretionary spending or inefficient investments with relatively little external scrutiny (Jensen, 1986; Jensen & Meckling, 1976). Inefficient firms tend to experience unstable operational performance, poor resource allocation, and uncertainty, which increase managers' incentives to maintain large precautionary cash reserves. By contrast, firms with high operational efficiency generally exhibit strong managerial discipline, stable cash flows, and effective internal resource management, thereby reducing the need to retain excessive liquidity.

Trade-off theory further explains that firms determine their optimal cash holdings by balancing the benefits of liquidity against the opportunity costs of holding idle cash (Opler et al., 1999). Efficiently operating firms are generally better able to generate stable operational cash flows and forecast future liquidity needs accurately than inefficient firms. Consequently, efficient firms rely less on precautionary cash holdings because operational efficiency reduces uncertainty and enhances financial flexibility. Chen et al. (2020) show that Chinese firms with high internal control quality exhibit low abnormal cash holdings, and they interpret this finding as indicating that effective internal controls help firms maintain optimal cash levels and manage both upside and downside liquidity risks. This finding further supports the argument that efficient operational and governance systems reduce firms' dependence on excessive cash reserves.

In addition, Wang et al. (2024) find a significant negative relationship between firm efficiency and cash holdings and suggest that firms with high operational efficiency tend to maintain low levels of cash. Efficient firms are generally effective at strategically utilizing resources and navigating financial uncertainty, and this effectiveness reduces their need for substantial liquidity buffers. Rather than maintaining excessive cash reserves, firms that prioritize operational efficiency and resource optimization tend to allocate resources to productive investments or debt reduction (Chen et al., 2020; Zhang et al., 2023). This evidence reinforces the notion that operational efficiency not only enhances firms' strategic performance but also shapes corporate liquidity management behavior.

These arguments collectively indicate that firms' ESG scores indirectly influence corporate cash holdings through firm efficiency. Firms with superior ESG performance are more likely to enhance operational efficiency by integrating sustainability practices into core operations and improving resource utilization than firms with inferior ESG performance. Operational efficiency subsequently strengthens firms' ability to generate internal cash flows, manage uncertainty, and preserve strategic financial flexibility. Consequently, efficient firms may maintain cash holdings not solely for precautionary purposes but also to support long-term investments, sustainability initiatives, and future growth opportunities. Accordingly, firm efficiency serves as an important mechanism through which ESG performance shapes corporate cash holding policies.

H2: Firm efficiency mediates the relationship between ESG scores and cash holdings.

Methodology

Sampling and Research Period

The population of this study comprises non-financial firms listed on the Indonesia Stock Exchange that have available ESG score data in the Bloomberg database during the period from 2018 through 2022. Financial sector firms are excluded from the analysis because they are subject to strict regulatory requirements and structural characteristics that distinguish them from non-financial firms.

The sampling technique employed in this study is purposive sampling, which involves selecting firms based on specific criteria. The inclusion criteria are that firms must (1) be listed on the Indonesia Stock Exchange, (2) operate in a non-financial sector, and (3) have ESG score data available in the Bloomberg database for at least one year within the 2018–2022 period. By applying these criteria, we obtain a total of 405 firm-year observations, which serve as the final sample for our empirical analysis.

Variables

This study employs three main variables: cash holdings (CASH), ESG scores (ESG), and firm efficiency (EFF). Cash holdings are measured using the ratio of cash and cash equivalents to total assets, following the approach of Chen et al. (2015). This ratio reflects the proportion of a firm's assets held in liquid form and is commonly used to assess a company's liquidity position and cash management strategy.

The ESG scores are obtained from the Bloomberg database, which provides standardized ESG ratings ranging from 0.1 to 100. A high score indicates a strong corporate commitment to disclosing and addressing ESG issues in accordance with Bloomberg's reporting framework (Meng-tao et al., 2023).

We measure EFF using the data envelopment analysis (DEA) method, specifically, the variable returns to scale (VRS) model. The VRS assumption allows for the possibility that changes in inputs may result in disproportionate changes in outputs, either increasing or decreasing returns, rather than assuming a constant rate of return. This model uses an output-oriented approach to maximize output given the existing inputs. The resulting efficiency scores range from 0 to 1, with values approaching 1 indicating a high level of operational efficiency.

The DEA-based efficiency score, $EFF_{i,t}$, is calculated as follows (Afsharian et al., 2021):

$$EFF_{it} = \frac{\sum_{r=1}^N u_r y_r}{\sum_{i=1}^N v_i x_i}$$

where:

- u_r = weight assigned to output r
- y_r = quantity of output r
- v_i = weight assigned to input i
- x_i = quantity of input i

The input variables include operating expenses (OPEX), cost of goods sold (COGS), and plant, property, and equipment (PPE). The output variables consist of sales and net income.

To control for firm-level financial characteristics, we add the following control variables: capital expenditures (CAPEX = capital expenditure divided by total assets), leverage (LEV = total debt divided by total assets), and firm size (SIZE = natural logarithm of total assets). These control variables are used to isolate the specific effects of ESG and efficiency on cash holding decisions.

Referring to the Hayes mediation testing method Model 4 (Hayes, 2015), the estimation model used in this research is:

$$EFF_{it} = \alpha_{0,1} + \beta_{1,1}ESG_{it} + \beta_{2,1}CAPEX_{it} + \beta_{3,1}LEV_{it} + \beta_{4,1}SIZE_{it} + \epsilon_{it} \quad (1)$$

$$CASH_{it} = \alpha_{0,2} + \beta_{1,2}ESG_{it} + \beta_{2,2}EFF_{it} + \beta_{3,2}CAPEX + \beta_{4,2}LEV_{it} + \beta_{5,2}SIZE + \epsilon_{it} \quad (2)$$

Empirical Results

Table 1 presents the descriptive statistics for all of the variables. The average CASH among firms is 12.38% of total assets, with values ranging from 0.18% to 92.80% and, thus, indicating varying liquidity strategies. The average ESG score of 42.41, with a relatively wide dispersion (standard deviation = 11.64), reflects variation in the levels of sustainability disclosure.

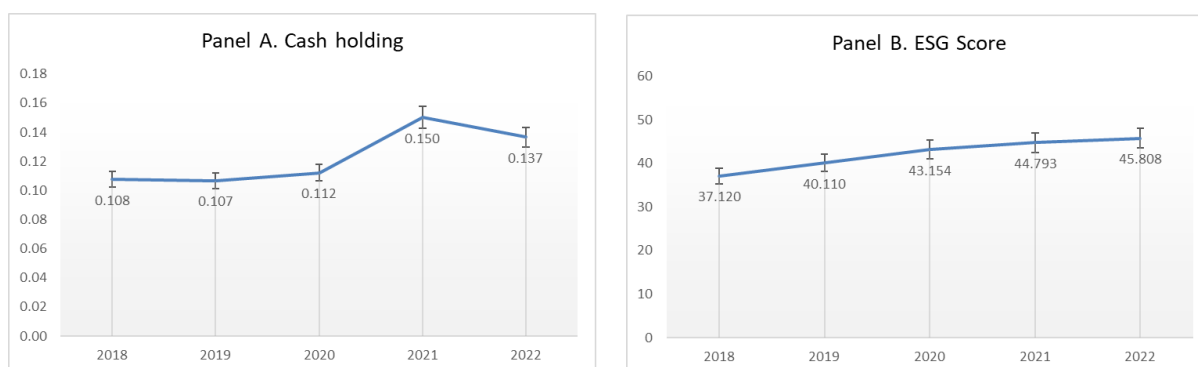
Table 1. Descriptive Statistics

Variable	Mean	Maximum	Minimum	Std. Deviation
CASH	0.12382	0.92804	0.00183	0.11073
ESG	42.41139	73.86580	17.94590	11.64397
EFF	0.50026	1.00000	0.00105	0.29404
CAPEX	0.04324	0.27428	0.00000	0.03924
LEV	0.48979	2.02154	0.03313	0.23023
SIZE	29.09909	33.65519	19.91807	3.65879

Source: authors (2026)

The mean EFF of 0.50026 shows moderate efficiency across the firms, with considerable variation (minimum = 0.00105; maximum = 1.00000). CAPEX averages 4.32% of total assets, while LEV has a mean of 48.98%, with the highest value exceeding 200%. These results indicate variation in financial risk exposure. SIZE, measured as the natural logarithm of total assets, averages 29.10, with both large and small firms being represented. Overall, the data exhibit sufficient variability to support further regression and mediation analysis.

The following section presents the annual trends in average ESG scores and cash holdings.



Source: authors (2026)

Figure 1. Trends in Cash Holdings and ESG Scores Over Time

Panel A in Fig. 1 illustrates the average cash holding ratio of firms from 2018 through 2022. The data reveal a relatively stable trend from 2018 through 2020, with cash holdings slightly increasing, from 0.108 to 0.112. A notable surge then occurred in 2021, when the average cash holding peaked at 0.150, likely reflecting precautionary liquidity measures in response to the COVID-19 pandemic. However, this figure slightly declined, to 0.137, in 2022, suggesting a partial normalization of liquidity strategies post-crisis.

Panel B displays the average ESG scores over the same period. Unlike cash holdings, ESG performance shows a steady upward trajectory, from 37.120 in 2018 to 45.808 in 2022. This trend indicates a growing corporate commitment to sustainability practices, with improvements observed across all three ESG dimensions over time. The two panels suggest a possible relationship between rising ESG engagement and evolving cash management strategies, which this study seeks to explore through empirical analysis.

We conduct a mediation analysis to examine whether EFF mediates the relationship between ESG scores and CASH using Model 4 of Hayes' PROCESS macro while controlling for CAPEX, LEV, and SIZE.

Table 2. Direct and Indirect Effects of ESG on Cash Holding

Antecedents	Consequent			
	EFF		CASH	
	Coeff	SE (HC0)	Coeff	SE (HC0)
Panel A. Regression Analysis				
Constant	0.1663	0.1573	0.3891	0.0510
ESG	0.0033 **	0.013	-0.00005	0.0004
EFF	-	-	0.0666 ***	0.0155
CAPEX	0.4405	0.3855	-0.3892 ***	0.1273
LEV	-0.1190 *	0.0616	-0.2151 ***	0.0255
SIZE	0.0080 *	0.0042	-0.0060 ***	0.0014
R2	0,0360		0.2851	
F (HC0)	3.6660 ***		19.7477 ***	
Panel B. Total Effect of ESG on CASH				
Effect	SE (HC0)	LLCI	ULCI	
0.0002	0.0004	-0.0007	0.0010	
Panel C. Direct Effect of ESG on CASH				
Effect	SE (HC0)	LLCI	ULCI	
-0.0000	0.0004	-0.0009	0.0008	
Panel D. Indirect Effect of ESG on CASH				
EFF	Effect	BootLLCI	BootULCI	
	0.0230	0.0036	0.0486	

Note: Coeff = unstandardized regression coefficient

***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively

Source: authors' calculations (2026)

Table 2 indicates that ESG has a positive and statistically significant effect on EFF, with a coefficient of 0.0033 and a p-value of 0.0125. This finding suggests that firms with high ESG scores tend to operate efficiently and thus supports the notion that a commitment to sustainability enhances resource utilization and operational discipline. In turn, EFF has a positive and significant effect on CASH, with a coefficient of 0.0666 and a p-value of 0.0000. This finding implies that efficient firms tend to hold high cash levels, likely because they can better manage operations and allocate financial resources strategically than when cash levels are low.

However, the direct effect of ESG on CASH (path c') is not statistically significant, as indicated by a coefficient of -0.00005 and a p-value of 0.9155. This finding suggests that ESG performance does not directly affect cash holdings. Despite the absence of a significant direct effect, the indirect effect through EFF is statistically significant, as the 95% bootstrap confidence interval (BootLLCI = 0.0000; BootULCI = 0.0005) does not include zero. This finding confirms the presence of a significant mediation effect and indicates that firm efficiency fully mediates the relationship between ESG and cash holdings.

These results highlight the critical role of operational efficiency as the mechanism through which ESG practices influence corporate liquidity. Rather than affecting cash holdings directly, strong ESG performance enhances efficiency, thereby promoting deliberate and sustainable cash management decisions. This finding reinforces the view that sustainability-oriented firms may benefit not only in terms of reputation but also in terms of internal financial discipline and resource optimization.

Based on the results of the mediation analysis, the relationships among ESG, firm efficiency, and cash holding can be depicted as follows:

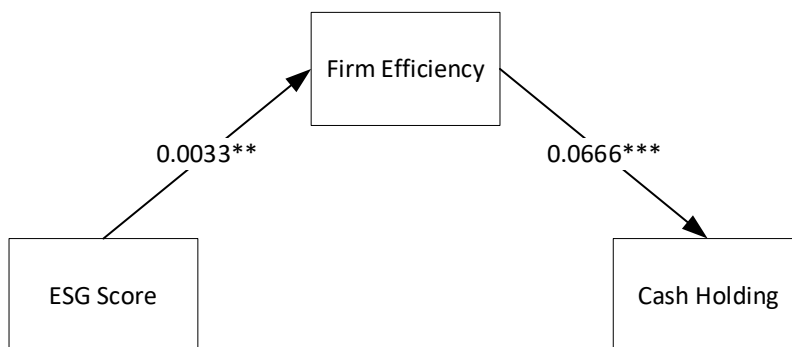


Figure 2. Full Mediation Model

Fig. 2 illustrates the mediation model tested in this study, in which firm efficiency serves as a mediating variable of the relationship between ESG scores and cash holdings.

- a. The path from ESG scores to firm efficiency ($\beta = 0.0033$, $p < 0.05$) indicates a positive and statistically significant relationship. Thus, firms with high ESG scores tend to be operationally efficient. This finding supports the idea that the implementation of sustainable practices enhances the effectiveness of resource management.
- b. The path from firm efficiency to cash holding ($\beta = 0.0666$, $p < 0.01$) also shows a positive and highly significant effect, thus implying that efficient firms are likely to hold high levels of cash.

Efficient operations may free up resources or improve financial flexibility, thereby enabling firms to maintain healthier liquidity positions.

- c. Notably, the direct path from ESG scores to cash holding is not shown, suggesting that the relationship between ESG and cash holding is fully mediated by firm efficiency. In other words, ESG scores influence cash holding indirectly through their impact on firm efficiency.

Robustness Test

To ensure the robustness of the main findings, we conduct an additional analysis to examine whether the COVID-19 pandemic influenced the relationships among ESG, EFF, and CASH. The sample period is divided into two distinct phases: the pre-COVID period (2018–2019) and the COVID period (2020–2022). This division is intended to capture the potential structural shifts in corporate financial behavior triggered by the global health and economic crisis. It is widely recognized that the COVID-19 pandemic increased corporate uncertainty and liquidity concerns, and this increase could, in theory, affect cash holding behavior. Thus, we perform a robustness check by introducing a COVID dummy variable with a value of 1 for 2020–2022 and 0 for 2018–2019.

However, the results of this additional test indicate that the COVID-19 pandemic did not have a statistically significant effect on corporate cash holdings in the sample. That is, the inclusion of the COVID variable alters neither the direction nor the magnitude of the primary relationships under investigation. Given the lack of significance and limited explanatory power, we do not present the full results of the COVID-19 robustness test. These findings suggest that the dynamics among ESG performance, firm efficiency, and cash policy remained stable across the pandemic and non-pandemic periods, thereby reinforcing the validity and generalizability of the main conclusions.

Discussion

The findings of this study provide important insights into the mechanism by which ESG performance influences corporate cash holding policies. The empirical results reveal that the direct effect of ESG on cash holdings is statistically insignificant, whereas the indirect effect through firm efficiency is positive and significant, indicating full mediation. This finding suggests that ESG practices alone may not directly alter firms' liquidity policies. Instead, ESG influences cash holding behavior indirectly by improving firms' operational capability and resource allocation efficiency.

The positive relationship between ESG performance and firm efficiency is consistent with stakeholder theory and the RBV, according to which ESG practices improve operational discipline, the quality of resource allocation, and organizational capability. This finding also aligns with prior empirical studies showing that firms with strong ESG performance tend to exhibit operational efficiency and effective process management (Wang et al., 2025; Xie et al., 2019).

While ESG significantly improves firm efficiency, the findings further indicate that operational efficiency positively affects corporate cash holdings. This result suggests that operationally efficient firms do not necessarily reduce their cash reserves. Instead, efficient firms may possess a greater capacity to generate, accumulate, and strategically retain cash than inefficient firms. In this context, cash holdings should not be interpreted solely as a manifestation of agency problems or inefficient resource allocation but also as a form of strategic financial flexibility that enables firms to support long-term investments, maintain operational resilience, and respond to uncertainty in the business environment.

From the perspective of trade-off theory, firms determine their optimal level of cash holdings by balancing the benefits of liquidity against the opportunity costs of holding idle cash (Opler et al., 1999). Operationally efficient firms are generally effective at managing costs, generating stable internal cash flows, and accurately forecasting liquidity needs. As a result, efficiency not only reduces operational waste but also enhances firms' ability to generate financial surpluses. Rather than immediately

distributing or exhausting these excess resources, efficient firms may strategically retain cash to preserve financial flexibility and support future investment opportunities, including sustainability-related investments, digital transformation, expansion, and innovation activities.

This finding is also consistent with the financial flexibility perspective. Bates et al. (2009) argue that firms increase cash holdings to avoid losing profitable investment opportunities when internal cash flows become insufficient or external financing becomes costly. Similarly, Almeida et al. (2004) and Denis and Sibilkov (2010) demonstrate that financially constrained firms tend to accumulate cash to reduce their dependence on expensive external financing during adverse conditions. This argument becomes particularly relevant in the context of emerging markets such as Indonesia's, where access to external financing is often relatively costly, unstable, and sensitive to macroeconomic conditions. Under such circumstances, efficient firms may intentionally maintain large cash reserves as a form of self-insurance against future financing constraints and economic uncertainty.

The positive relationship between firm efficiency and cash holdings may also be understood within an expanded precautionary motive framework, whereby efficient firms retain cash as a strategic buffer against future uncertainty. Traditionally, precautionary cash holdings are associated with firms facing uncertainty and financing frictions. However, recent evidence suggests that firms characterized by strong integrity and governance quality may also maintain large cash reserves as part of prudent financial management. Thus, Treepongkaruna et al. (2026) find that firms with higher corporate integrity maintain significantly larger cash reserves than firms with lower corporate integrity, a finding that supports the safety-net hypothesis and suggests that high-integrity firms tend to adopt conservative liquidity policies to mitigate potential risks and uncertainty. In this context, operational efficiency may strengthen firms' ability to build precautionary liquidity buffers rather than reduce the need for cash holdings.

Within the ESG framework, this result becomes even more meaningful. ESG implementation often requires substantial long-term investment in environmental protection, governance systems, stakeholder engagement, and sustainability-related innovation. Firms with strong ESG performance may therefore require substantial internal liquidity to finance sustainability transformation and maintain compliance with evolving environmental and social regulations. Chen et al. (2025) show that firms with strong environmental commitments tend to maintain high cash holdings because environmental regulations increase financing needs and create additional liquidity demands associated with green investment and compliance costs. Consequently, operationally efficient firms may strategically accumulate cash, not because they are inefficient, but because they are better positioned to finance future sustainability-related expenditures and maintain long-term strategic flexibility.

This finding differs from the findings of Wang et al. (2024), who report that ESG-driven efficiency reduces cash holdings among Chinese non-financial firms. The difference may be attributable to differences in institutional and financial markets across countries. In emerging markets such as Indonesia, where external financing conditions are relatively less developed and more volatile, operational efficiency may strengthen firms' incentive to retain cash rather than reduce it. In other words, efficiency in this context reflects strong cash-generating capability and strategic liquidity capacity rather than merely low precautionary liquidity needs.

Overall, these findings indicate that ESG performance affects corporate cash holding policies indirectly through operational efficiency. ESG practices enhance firms' operational capabilities, governance quality, and resource-allocation efficiency, thereby strengthening their ability to generate internal financial surpluses and preserve strategic liquidity reserves. Therefore, in the context of this study, cash holdings should not be viewed solely as an indication of agency problems but also as a reflection of firms' strategic preparedness, financial flexibility, and sustainability-oriented long-term planning.

Conclusions

This study examines the relationship between ESG performance and corporate cash holdings by investigating the mediating role of firm efficiency among Indonesian non-financial firms. The findings show that ESG does not directly affect corporate cash holdings but does significantly increase firm efficiency, and this increase in efficiency positively affects cash holdings, indicating full mediation.

These findings suggest that ESG practices influence corporate liquidity policy indirectly through operational capability enhancement. The results also indicate that operationally efficient firms tend to maintain large cash reserves, not necessarily because of agency problems, but as part of strategic financial flexibility. In the context of emerging markets such as Indonesia's, efficient firms may intentionally retain cash to support future investments, sustainability initiatives, and resilience against financing uncertainty.

This study contributes to the ESG-finance literature by providing evidence that the relationship between ESG and cash holdings is more complex than previously documented. The findings indicate that cash holdings may reflect strategic preparedness and internal financing capacity rather than inefficient resource allocation. In addition, the findings emphasize the importance of considering operational efficiency an underlying mechanism linking ESG practices and corporate financial policies.

Despite these contributions, this study has several limitations. First, the analysis focuses only on Indonesian non-financial firms and thus may limit the generalizability of the findings. Future studies could, therefore, involve cross-country comparisons or examine differences between developed and emerging markets. Second, this study employs operational efficiency, measured using the DEA method, as the mediating variable, but future research could explore alternative mediating mechanisms, such as financing constraints, corporate governance quality, innovation capability, or investment efficiency. Lastly, future studies could also investigate whether the relationship between ESG and cash holdings varies across industries, firm life cycle stages, or institutional environments.

Statement of Conflict of Interest

The author declares that there are no conflicts of interest in this study. The entire research process and the writing of this article were conducted independently, without any personal, commercial, or institutional interests that could influence the results or interpretation of this study.

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