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Corporate environmental, social and governance (ESG) scores and corporate liquidity management (CLM): evidence from Australia

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Abstract

Purpose – This study aims to investigate the impact of environmental, social and governance (ESG) scores on corporate liquidity management (CLM) in Australian Securities Exchange (ASX)-listed companies for the 2010–2023 period.

Design/methodology/approach – Using various measures in addition to ESG scores and CLM, such as net working capital (NWC), the cash conversion cycle (CCC) and operating cash flow (OCF), and by using 1,100 firm-year observations, this study uses ordinary least squares (OLS) regression to examine the ESG scores–CLM relationship. The study employs robust econometric models to address sample selection bias, endogeneity and heterogeneity, ensuring reliable results.

Findings – The study's findings are that higher ESG scores are positively associated with higher NWC, reflecting improved CLM. Furthermore, ESG scores are negatively related to OCF and the CCC, demonstrating that firms with strong ESG practices efficiently convert resources into cash flow.

Practical implications – This study highlights the importance of integrating ESG practices with CLM strategies to enhance financial and capital stability.

Originality/value – This study contributes to the literature and provides a new avenue of knowledge on ESG performance and CLM.

Keywords Corporate environmental, Social and governance (ESG), Corporate liquidity management (CLM), Net working capital (NWC), Cash conversion cycle (CCC), Operating cash flow (OCF), Australia

Paper type Research paper

1. Introduction

Environmental, social and governance (ESG) scores have emerged as prominent global benchmarks for assessing the sustainability and ethical impact of corporate operations

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(Abdi *et al.*, 2022). Growing regulatory pressures and increasing expectations from investors and other stakeholders have encouraged firms to integrate ESG considerations into their business strategies and corporate governance practices (Adeneye *et al.*, 2023; Aladwan *et al.*, 2024). Although ESG initiatives were initially driven by environmental concerns, their importance has expanded to broader aspects of corporate performance, including financial stability and liquidity management (Alareeni and Hamdan, 2020; Bianchi and Bigio, 2022; Feng *et al.*, 2020; Issa and Hanaysha, 2023; La Rosa and Bernini, 2022; Sahu *et al.*, 2024).

Recent studies suggest that firms with stronger ESG performance benefit from enhanced stakeholder trust, improved access to financing, lower borrowing costs, and reduced regulatory risk (Ali *et al.*, 2022; Andrieș and Sprincean, 2023; Ben Ali and Chouaibi, 2024). These advantages may strengthen corporate liquidity management (CLM) by improving firms' ability to meet short-term obligations and maintain financial flexibility. However, the relationship between ESG performance and CLM remains insufficiently understood. While a growing body of literature has examined the association between ESG performance and broader financial outcomes, relatively limited attention has been devoted to understanding how ESG performance relates to key liquidity management measures, including net working capital (NWC), operating cash flow (OCF) and the cash conversion cycle (CCC). Existing evidence remains fragmented and inconclusive, particularly in developed markets such as Australia (Horobeț *et al.*, 2023; Ben Ali and Chouaibi, 2024; Laghari *et al.*, 2022).

Australia provides a particularly relevant setting for investigating this relationship. The country has a well-developed capital market and has experienced growing regulatory and stakeholder pressure regarding ESG disclosure and corporate sustainability practices. In addition, Australian Securities Exchange (ASX)-listed firms operate within an environment characterised by increasing transparency requirements and heightened investor attention to ESG performance. These features make Australia an appropriate empirical context through which to examine the broader relationship between ESG performance and CLM.

Accordingly, this study examines the association between ESG scores and CLM among ASX-listed firms during the 2010–2023 period. Specifically, the study investigates whether ESG performance is associated with NWC, OCF and the CCC, three widely used measures of CLM. Using a sample of 1,100 firm-year observations, the study employs advanced econometric techniques, including machine learning models, Heckman's (1979) two-stage procedure and propensity score matching (PSM), to address potential endogeneity and selection bias concerns.

The findings indicate that firms with stronger ESG performance generally exhibit superior liquidity management. Specifically, firms with higher ESG scores tend to maintain more efficient working capital positions and shorter operating and CCCs, suggesting improved cash flow management and lower liquidity risk.

This study contributes to the literature in several ways. Firstly, it addresses a broader theoretical gap by examining the relationship between ESG performance and CLM, an area that has received considerably less attention than the ESG–financial performance relationship. Secondly, it provides comprehensive evidence from Australia, an important but underexplored market in the ESG literature. Thirdly, the study demonstrates how firm-specific characteristics influence the ESG–liquidity relationship, thereby offering a more nuanced understanding of the mechanisms through which ESG performance may affect financial outcomes. Finally, by employing advanced econometric techniques and recent ESG metrics, the study provides robust evidence regarding the financial implications of ESG practices for managers, investors and policymakers.

2. Theoretical framework

In seeking a reasonable answer to the question of whether corporate ESG scores have any impact on CLM, this study is grounded in two complementary theoretical perspectives – stakeholder

theory and signalling theory – which together provide a robust framework for understanding the ESG–CLM relationship. While stakeholder theory emphasises the role of firm–stakeholder relationships in shaping liquidity outcomes, signalling theory highlights how ESG activities and disclosures convey information to external capital market participants and influence firms' access to finance and liquidity conditions. Stakeholder theory explains how firms' relationships with key stakeholder groups influence corporate performance and financial decision-making, including liquidity management (Freeman, 1984). Among its three approaches – descriptive, normative and instrumental – this study adopts the instrumental stakeholder perspective, which views ESG practices as strategic mechanisms that enhance firm value by strengthening stakeholder relationships and improving operational efficiency.

From an instrumental standpoint, strong ESG performance fosters trust and cooperation with employees, suppliers, customers, regulators and capital providers. These improved stakeholder relationships directly affect firms' working capital dynamics by facilitating favourable trade credit terms, faster receivables collection, and more stable operational processes, thereby shortening the CCC. At the same time, enhanced employee engagement and governance quality improve cash flow predictability and resource allocation efficiency, enabling firms to maintain more stable and optimal levels of NWC.

Furthermore, superior ESG performance reduces perceived firm risk and information asymmetry, strengthening stakeholders' confidence in firms' long-term viability. This results in improved access to external finance, lower financing costs and greater financial flexibility, which reduces the need for precautionary liquidity buffers and supports more efficient OCF generation. Consistent with this argument, prior empirical evidence shows that firms with higher ESG scores experience enhanced stakeholder trust, reduced risk exposure, and superior liquidity-related outcomes (Ibikunle *et al.*, 2016; Ali *et al.*, 2022; Atif *et al.*, 2022; Andrieș and Sprincean, 2023; Bissoondoyal-Bheenick *et al.*, 2023; Almnadheh *et al.*, 2025). Accordingly, stakeholder theory predicts that stronger ESG performance is associated with more efficient CLM, reflected in higher NWC stability, shorter CCC and improved OCF efficiency. Complementing this stakeholder-based perspective, signalling theory provides an additional market-based explanation by focusing on how ESG information is interpreted by external investors and creditors. Signalling theory explains how ESG performance and disclosure influence CLM through capital market channels (Bergh *et al.*, 2014). High-quality ESG engagement and transparent disclosure act as credible signals of firm quality, effective risk management, and long-term orientation. Such signals reduce information asymmetry, improve investor confidence, and facilitate access to external financing at lower cost, thereby easing liquidity constraints and reducing reliance on precautionary cash holdings. Empirical evidence suggests that proactive ESG disclosure enhances transparency and supports more effective liquidity management, particularly in jurisdictions with strong regulatory frameworks (Drempetic *et al.*, 2020; Oyewo, 2023; Saleh *et al.*, 2025). However, the effectiveness of ESG signalling depends on the credibility, consistency and standardisation of reporting frameworks, as inconsistent metrics and weak alignment with financial strategy can limit the impact of disclosures on liquidity outcomes (Galeone *et al.*, 2024; Horobeț *et al.*, 2023; Agarwala *et al.*, 2024).

Taken together, stakeholder theory and signalling theory provide complementary insights into how ESG performance can shape firms' liquidity management through both real operational channels and capital market mechanisms.

3. Literature review and hypotheses development

3.1 Literature review

The relationship between ESG factors and various financial outcomes has been a topic of interest in both academic research and corporate practice for decades. Scholars have

explored how ESG performance impacts firm value (Abusharbeh *et al.*, 2023; Aljughaiman *et al.*, 2024; Andrieș and Sprincean, 2023) cost of finance (Giakoumelou *et al.*, 2024; Horobeț *et al.*, 2023); and risk management strategies (Adeneye *et al.*, 2023; De Lucia *et al.*, 2020). A substantial body of research highlights the dual value of ESG, showing that strong ESG performance not only contributes to societal well-being, but also enhances firm performance. For instance, Abdi *et al.* (2022), Adeneye *et al.* (2023) and Alareeni and Hamdan (2020) suggest that firms with robust ESG practices tend to achieve greater profitability and improved economic performance. Furthermore, firms with superior ESG scores experience reduced idiosyncratic risk (Ali *et al.*, 2022; Andrieș and Sprincean, 2023); lower equity capital costs (Bissoondoyal-Bheenick *et al.*, 2023; Buallay, 2019; Chen and Xie, 2022); higher payout ratios (De Lucia *et al.*, 2020); and better access to capital (Atif *et al.*, 2022; Dicuonzo *et al.*, 2024; Galeone *et al.*, 2024). These financial advantages underscore the role of ESG scores in enhancing corporate resilience and operational efficiency.

Despite studies conducted on ESG scores and firm operational efficiencies, research specifically examining the link between ESG scores and CLM is scarce. Emerging studies suggest that firms with higher ESG scores tend to have better access to liquidity owing to improved stakeholder trust and reduced perceived risk (Buallay, 2019; Oyewo, 2023). Furthermore, ESG performance appears to influence firms' ability to secure funding on favourable terms, with this having a positive effect on liquidity management strategies (Almeida *et al.*, 2013; Chen and Xie, 2022). For example, environmentally conscious firms have been found to experience lower capital constraints, indicating that ESG practices enhance both corporate reputation and financial resilience (He *et al.*, 2023; Manita *et al.*, 2018). These insights highlight the growing recognition of ESG dimensions as critical factors in shaping financial decision-making and liquidity management.

Similarly, ESG disclosures are gaining prominence in liquidity management. Firms that provide comprehensive ESG reports tend to attract sustainability-focused investors which strengthens their liquidity positions (Ali *et al.*, 2022). Transparency is enhanced by ESG reporting as it reduces information asymmetry, thus building stakeholder trust, improving access to funding and mitigating liquidity risk (Galeone *et al.*, 2024; Pedersen *et al.*, 2021). However, it is worth noting that the effectiveness of ESG disclosures in predicting liquidity risks depends on the reliability of ESG ratings/scores and consistency in reporting standards (Drempetic *et al.*, 2020).

Empirical evidence shows that firms with higher ESG scores often maintain higher cash reserves and have better access to credit facilities (Ibikunle *et al.*, 2016; Oyewo, 2023). These findings highlight that ESG scores can serve as a signalling mechanism for investors, indicating a firm's long-term financial stability and resilience (Baker *et al.*, 2020; Friede *et al.*, 2015). However, the relationship between ESG scores and liquidity risk varies across industries and regions. For example, the impact of ESG practices on liquidity risks may be more pronounced in sectors in which sustainability concerns are highly prioritised, such as financial services and manufacturing (Cho *et al.*, 2021; Fang *et al.*, 2018). Furthermore, some studies suggest that the relationship between ESG performance and liquidity risks may follow a non-linear pattern, requiring further exploration to understand its nuances (Luo, 2022; Meng-tao *et al.*, 2023).

According to the non-linear relationship literature in ESG and financial performance, firms with either very low or very high ESG scores may face higher liquidity risks than those with moderate ESG scores. The rationale behind this pattern lies in the costs associated with implementing ESG practices, which may initially increase liquidity risks before yielding long-term financial benefits (Bose *et al.*, 2021). Firms investing heavily in ESG practices

may face short-term cash flow constraints owing to the upfront costs of sustainability initiatives. However, these investments are expected to pay off in the long run by improving stakeholder trust and reducing financing costs (Khalil *et al.*, 2023). This finding highlights the complex trade-offs that firms must navigate when balancing ESG investments with liquidity management.

Despite a growing body of literature on the ESG performance–CLM relationship, significant research gaps remain, particularly regarding the applicability of ESG practices in emerging economies, with limited exploration of how ESG factors influence liquidity management in these regions (Ben Ali and Chouaibi, 2024; Horobeț *et al.*, 2023; Laghari *et al.*, 2022). Most studies have focused on developed markets generally; however, systematic empirical investigation of the ESG–CLM relationship using comprehensive liquidity metrics (NWC, OCF and CCC) and rigorous econometric methods remains limited, including within the Australian context (Ben Ali and Chouaibi, 2024; Horobeț *et al.*, 2023; Laghari *et al.*, 2022). Furthermore, a deeper investigation is needed into how specific ESG dimensions (environmental, social and governance) individually impact liquidity management practices (Adeneye *et al.*, 2023). Addressing these gaps would provide a more comprehensive understanding of how ESG factors shape firms' financial strategies in diverse regulatory environments.

Empirical evidence highlights the role of regulatory frameworks in shaping ESG practices, particularly in jurisdictions with stricter sustainability reporting requirements. Firms that proactively disclose their ESG performance are more likely to enhance transparency and reduce information asymmetry which can improve their access to financing with better management of their liquidity risk (Drempetic *et al.*, 2020; Oyewo, 2023). However, scholars caution that the effectiveness of ESG disclosures hinges on the standardisation of reporting frameworks and the alignment of ESG practices with firms' broader financial goals. Without consistent reporting standards, the impact of ESG disclosures on liquidity management may be limited (Galeone *et al.*, 2024; Horobeț *et al.*, 2023).

The relationship between ESG performance and CLM is a critical area of research with significant implications for financial management. While existing studies provide valuable insights, more research is needed to explore the specific mechanisms through which ESG factors influence liquidity management across different contexts and industries (Khalil *et al.*, 2023), with these studies scarce in the context of Australia. Addressing these gaps could help firms to integrate ESG considerations into their liquidity management strategies, ultimately contributing to more sustainable financial practices.

3.2 Hypotheses development

3.2.1 Environmental, social and governance performance and net working capital. Corporate ESG performance has emerged as an important determinant of firms' financial health and liquidity management. Firms with higher ESG scores often demonstrate stronger operational efficiency, lower regulatory risk, and enhanced stakeholder trust, all of which contribute to more effective management of working capital. Prior studies show that firms with superior ESG performance tend to achieve better financial outcomes and profitability (Abdi *et al.*, 2022; Adeneye *et al.*, 2023; Alareeni and Hamdan, 2020; Wang *et al.*, 2023). These benefits improve firms' ability to maintain adequate current assets relative to current liabilities and support efficient liquidity management.

One mechanism through which ESG performance enhances liquidity is the reduction of environmental compliance costs and regulatory risks. Firms that proactively adopt ESG practices are less exposed to penalties and reputational damage, thereby preserving cash

resources and improving financial flexibility. Furthermore, ESG-oriented firms often enjoy stronger relationships with investors, creditors and suppliers, leading to improved access to capital and more favourable financing conditions. In addition, growing consumer demand for sustainable products can increase revenues and cash inflows, while operational efficiencies derived from better resource utilisation and waste reduction further strengthen working capital management (Galeone *et al.*, 2024; Giakoumelou *et al.*, 2024).

Although ESG initiatives may require substantial upfront investments and generate short-term liquidity pressures, these temporary costs are generally outweighed by the long-term benefits associated with improved stakeholder confidence, reduced risk, and enhanced operational performance. Therefore, firms with stronger ESG performance are expected to maintain higher levels of NWC:

H1. A positive relationship exists between ESG scores and net working capital (NWC).

3.2.2 Environmental, social and governance performance and operating cash flow. ESG performance can also influence firms' OCFs through its impact on operational efficiency, risk management and stakeholder relationships. Firms with strong ESG practices are often better positioned to generate stable cash flows because they benefit from improved resource allocation, lower operational disruptions, and enhanced reputational capital. Ali *et al.* (2022) and Andrieș and Sprincean (2023) suggest that firms with higher ESG scores experience lower idiosyncratic risk, enabling more predictable financial management and cash flow generation.

Moreover, enhanced stakeholder trust may facilitate access to external financing and reduce financing constraints, allowing firms to operate more efficiently and manage liquidity requirements effectively. While the implementation of ESG initiatives may initially reduce available cash due to investment expenditures, the resulting improvements in operational efficiency and financial stability are expected to strengthen cash flow management over time. Consequently, firms with superior ESG performance are expected to exhibit more efficient OCF management:

H2. A negative relationship exists between ESG scores and operating cash flow (OCF).

3.2.3 Environmental, social and governance performance and cash conversion cycle. The relationship between ESG performance and the CCC reflects the extent to which ESG practices improve firms' ability to manage inventory, receivables and payables efficiently. Strong ESG performance enhances stakeholder relationships, including those with suppliers, customers and financial institutions, thereby facilitating smoother business operations and more efficient liquidity cycles. Firms with strong ESG credentials are more likely to experience favourable supplier terms, improved customer loyalty, and greater operational coordination, all of which contribute to shorter CCCs.

Conversely, poor ESG performance is often associated with operational inefficiencies, higher financing costs, greater regulatory risk and financial instability (Banerjee *et al.*, 2020; Wang and Sarkis, 2017). These factors can lengthen inventory holding periods, delay cash collections, and increase liquidity pressures. Furthermore, misalignment between firms and external capital providers may increase uncertainty regarding future cash flows and financing arrangements, thereby extending liquidity cycles (Bose *et al.*, 2021; Cordova *et al.*, 2021).

Overall, firms with strong ESG performance are expected to manage liquidity cycles more efficiently and convert investments into cash more rapidly than firms with poor ESG performance:

H3. A negative relationship exists between ESG scores and the cash conversion cycle (CCC).

4. Data collection and sample selection

This study investigates companies listed on the ASX. Table 1, Panel A outlines the sample selection process, in which the initial data set consisted of 7,168 firm-year observations from 2010 to 2023. As some companies did not have sufficient environmental and liquidity data, they were removed, with the final sample consisting of 1,100 firm-year observations.

Table 1, Panel B presents a breakdown of the sample by industry and year, highlighting the distribution of observations across various sectors. By excluding years prior to 2010, this study ensured access to a consistent data set that accurately reflected these evolving trends. The 14-year period makes it possible to perform a good longitudinal analysis, allowing our study to examine how ESG scores change over time and how corporate responsibility and financial performance change as is the case with rules and social expectations.

4.1 Measurement of variables

4.1.1 Dependent variables. This study explores the factors that influence *CLM* through a detailed examination of dependent, independent and control variables. To evaluate *CLM*, this study employs several key metrics. Firstly, *NWC* represents the difference between a firm's current assets and its liabilities, providing insight into the firm's short-term liquidity capacity (Adeneye *et al.*, 2023; Sikveland and Zhang, 2020). Secondly, the *CCC* measures the time required for a firm to convert its investments in inventory into cash flows from sales, encompassing the inventory conversion period, receivables collection period and payables deferral period (Alareeni and Hamdan, 2020; Bruna *et al.*, 2022). Thirdly, *OCF* captures the average duration to convert inventory into sales and subsequently into cash, covering both

Table 1. Sample selection and distribution

Details					Obs.
Panel A – Sample selection					
Firm-year observations for the timeline 2010–2023 with ESG data available					7168
Less: Firm-year observations with insufficient financial data and/or in financial industry					(6068)
Firm-year observations in the final sample					1100
ICB industry classification	Obs.	% of sample	Year	Obs.	% of sample
Panel B – sample breakdown by industry and year					
Communication services	60	5	2010	11	1
Consumer discretionary	192	17	2011	36	3
Consumer staples	83	8	2012	51	5
Energy	64	6	2013	66	6
Financials	51	5	2014	68	6
Health care	88	8	2015	81	7
Industrials	148	13	2016	90	8
Information technology	55	5	2017	117	11
Materials	242	22	2018	94	9
Real estate	91	8	2019	103	9
Utilities	26	2	2020	91	8
Total	*1100*	*100*	2021	87	8
			2022	94	9
			2023	111	10
			Total	*1100*	*100*

Note(s): This table outlines the sample selection procedure (Panel A) and the distribution of the sample across industries in accordance with the Industrial Classification Benchmark (ICB), as well as by year (Panel B)

the inventory holding period and the receivables collection period (Buallay, 2019; Drempetic *et al.*, 2020). Together, these metrics – *NWC*, *CCC* and *OCF* – provide a comprehensive view of how a firm manages cash flow and liquidity. By analysing these indicators, this study highlights the interconnections between financial metrics and underscores the importance of efficient asset utilisation and cash flow management (Andrieș and Sprincean, 2023).

4.1.2 Independent variable. This study primarily examines the combined ESG score (*ESGC*) as the main independent variable, with this serving as a measure of ESG performance. This score encompasses three key dimensions: environmental (*ESCORE*), social (*SSCORE*) and governance (*GSCORE*). The environmental score (*ESCORE*) assesses a firm's environmental performance through initiatives such as resource usage, green projects and carbon reduction efforts (Chen and Xie, 2022). The social score (*SSCORE*) evaluates the firm's alignment with societal goals, focusing on labour practices, community engagement, customer satisfaction and ethical standards (Manita *et al.*, 2018). The governance score (*GSCORE*) reflects governance practices, including board transparency, structure, regulatory compliance and shareholder engagement, while highlighting the quality of corporate governance (Liu *et al.*, 2023). Together, these three pillars form the ESG combined score (*ESGC*), offering a holistic view of the firm's overall ESG performance (Cheng *et al.*, 2024). This variable is central to the understanding of how sustainability practices influence liquidity management.

4.1.3 Control variables. This study incorporates several control variables that account for firm-specific characteristics and external factors that may influence liquidity management. Firm size (*FS*), measured by total assets, reveals a firm's scale and financial capacity, potentially impacting its ability to invest in sustainability initiatives (Fuadah *et al.*, 2022; Gillan *et al.*, 2021; Yitayaw, 2021; Yu *et al.*, 2018). Leverage (*LVG*), defined as the ratio of debt to equity, provides insight into a firm's financial structure and risk profile, with these, in turn, influencing investment decisions (Kretzschmar *et al.*, 2010; Tan *et al.*, 2024). Coverage (*COV*) calculated as "income before extraordinary items + interest expenses" divided by interest expenses, indicates a firm's ability to meet its interest obligations (Bruna *et al.*, 2022; Horobeț *et al.*, 2023).

Furthermore, *Beta* (β), which represents the stock's systematic risk relative to market volatility based on monthly returns, is included to account for market-related risks (Cheng *et al.*, 2024). Return on assets (*ROA*), calculated as net income divided by total assets, highlights asset profitability and provides insight into how efficiently a firm utilises its assets (Adeneye *et al.*, 2023). Other control variables include the dividend payout ratio (*DPR*), which measures the percentage of earnings distributed as dividends, reflecting the firm's dividend policy (Bruna *et al.*, 2022; Horobeț *et al.*, 2023). From a resource constraint perspective, firms with higher dividend payouts distribute a greater proportion of earnings to shareholders, which may reduce internally available funds for ESG-related sustainability investments and working capital management. We therefore expect a negative relationship between DPR and liquidity metrics such as NWC, as higher distributions reduce retained earnings and constrain short-term liquidity and board size (*BSIZE*), which indicates the total number of directors on a firm's board, with this influencing the governance structure (Gillan *et al.*, 2021). Larger boards provide greater monitoring capacity and broader expertise, facilitating more effective oversight of complex ESG integration strategies and their financial implications, including liquidity management (Manita *et al.*, 2018). We expect a positive relationship between board size and liquidity outcomes, consistent with evidence that governance quality supports ESG adoption and improved financial efficiency. Finally, CEO duality, which highlights whether the Chief Executive Officer (CEO) also serves as the board chair, is considered a potential indicator of the concentration of authority (Alareeni and Hamdan, 2020; Masa'deh *et al.*, 2024). CEO

duality may either enhance strategic coherence in ESG integration by enabling faster, unified decision-making, or reduce accountability by weakening board oversight of financial and sustainability practices. Given this mixed evidence, we include CEO duality as a control variable to account for its potential confounding influence on the ESG–CLM relationship. By integrating these control variables, this study comprehensively examines the dynamics of CLM and the impact of ESG scores. Definitions of all variables are provided in Appendix.

4.2 Econometric tools and model specification

To explore the real-world implications of our study's hypotheses, we examine whether ESG scores impact the CLM of companies listed on the ASX. For this purpose, we use panel regression analysis (Baltagi, 2008; Belotti *et al.*, 2017). Initially, we perform ordinary least squares (OLS) regression to assess the baseline ESG scores–CLM relationship. The OLS results provide a first insight into the strength and direction of the association between ESG scores and liquidity metrics. Then, to account for potential selection bias, we employ Heckman's (1979) two-stage model analysis, and to assess the causal impact on CLM of ESG, we use PSM analysis. These techniques help to isolate the effect of ESG from confounding factors and ensure that the observed relationships are not driven by firm characteristics unrelated to ESG performance. Firm fixed-effects models are also utilised to ensure that results are not affected by unobservable firm-level differences. By controlling firm-specific unobserved heterogeneity, fixed-effects models improve the internal validity of our estimates. In addition, to address potential endogeneity concerns and to ensure robustness and consistency of our results, we implement a two-stage least squares (2SLS) model and test alternative measurements. The 2SLS method allows us to account for reverse causality and omitted variable bias, providing more reliable estimates of the effect of ESG scores on liquidity. Finally, an ESG dimension analysis is conducted to examine how specific ESG dimensions (environmental, social and governance) individually influence corporate liquidity. This allows us to identify which aspects of ESG contribute most to liquidity management outcomes.

We evaluate the impact of ESG scores on CLM variables using the following baseline model for these analyses:

$$CLM_{it} = \alpha + \beta 1\, ESG_{it} + \beta 2\, Controls_{it} + year\ and\ industry\ FE + \varepsilon_{it} \quad (1)$$

where *CLM* (i.e. *NWC*, *OCF and CCC*) a CLM indicator; ESG_{it} denotes ESG score; and $Controls_{it}$ the vector of firm-specific control variables. Terms *i* and *t* account for individual and temporal effects, respectively, while ε_{it} captures the error term. This model framework allows us to quantify the relationship between ESG performance and liquidity, while controlling other factors that may influence liquidity outcomes.

5. Results and discussion

5.1 Descriptive statistics and correlation analysis

Table 2 presents the descriptive statistics for all variables used in this study, along with the univariate analysis. Panel A shows the mean, standard deviation, minimum, 25th percentile, median, 75th percentile and maximum values for the full sample, across various financial and governance variables. The mean and median values are 46.323 and 44.877, respectively, with a range of 2.497–95.565. The *NWC* measure of financial liquidity has a mean value of 0.880 and a median value of 0.437, with values ranging from −1.076 to 8.005. *OCF* shows a mean of 8.769 and a median of 8.456, whereas *CCC* has a mean value of 4.508 and a median value of 4.064. The mean (median) value of *FS* is 9.284 (9.307) months. *Beta* (β) captures

Table 2. Descriptive statistics for full sample and mean and median differences tests between Two Sub-samples

Variables	Mean	SD.	Min.	P25	Median	P75	Max.
Panel A – Descriptive statistics							
ESCORE	35.407	25.988	0.000	10.948	35.281	55.558	96.593
SSCORE	48.768	22.071	1.098	30.779	46.008	66.105	97.421
GSCORE	56.794	22.305	0.000	39.040	58.144	75.704	99.123
ESGC	46.323	19.406	2.497	31.250	44.877	60.372	95.565
NWC	0.880	1.403	−1.076	0.132	0.437	1.018	8.005
OCF	8.769	3.912	0.528	5.824	8.456	11.105	19.394
CCC	4.508	4.059	−5.225	1.812	4.064	7.050	14.843
ROA	0.076	0.073	−0.129	0.038	0.065	0.101	0.339
FS	9.284	0.777	6.609	8.773	9.307	9.830	11.041
Beta	1.089	0.606	0.048	0.676	0.979	1.425	3.030
LVG	0.486	0.189	0.064	0.348	0.481	0.611	0.929
DPR	0.533	0.477	0.000	0.213	0.530	0.718	3.110
BSIZE	7.139	1.890	3.000	6.000	7.000	8.000	12.000
CEODual	0.103	0.304	0.000	0.000	0.000	0.000	1.000
COV	29.454	11.992	0.000	2.757	7.828	17.104	476.165

	Low_ESG		*High_ESG*			
Variables	Mean	Median	Mean	Median	Mean test (*p*-value)	M-W test (*p*-value)
Panel B – Sub-samples separated based on the ESG industry median						
NWC	0.863	0.470	0.897	0.404	0.685	0.288
OCF	9.182	8.841	8.353	7.992	0.000	0.000
CCC	5.157	4.677	3.854	3.431	0.000	0.000
ROA	0.074	0.065	0.077	0.065	0.515	0.494
FS	9.075	9.034	9.495	9.463	0.000	0.000
Beta	1.025	0.916	1.154	1.071	0.000	0.000
LVG	0.478	0.473	0.495	0.483	0.118	0.226
DPR	0.513	0.504	0.553	0.553	0.169	0.003
BSIZE	6.741	6.000	7.540	8.000	0.000	0.000
CEODual	0.083	0.000	0.122	0.000	0.033	0.033
COV	30.489	7.434	28.412	8.353	0.737	0.051

Note(s): This table, Panel A presents descriptive statistics for the variables in the full sample. Panel B presents the univariate analysis results. The Mann–Whitney (M-W) test and *t*-test have been used to examine the median and mean differences, respectively, between firms with high and low ESG performance based on the industry median (*p*-values are Two-tailed). All variables are defined in Appendix

market risk with a mean value of 1.089 and a median value of 0.979. The *LVG* measure records a mean value of 0.486, whereas the *DPR* has an average value of 0.533. Governance characteristics, such as *BSIZE*, exhibit a mean of 7.139 members, while *CEODual* is present in 10.3% of firms. The average *COV* is 29.454.

To provide further insight, Table 2, Panel B compares the mean and median values of the key variables between firms with low ESG scores and firms with high ESG scores. Following Al Rabab'a *et al.* (2023), the industry median of ESG scores is used to separate the two sub-samples. The last two columns report the results of the *t*-test and the Mann–Whitney test, respectively, to examine the differences between the two groups. The mean *NWC* value for low ESG firms is 0.863, compared to 0.897 for high ESG firms, but this difference is not statistically significant. In contrast, operational measures, such as *OCF* and *CCC*, show significant differences between the two groups. Firms with low ESG scores show a higher

mean *OCF* (9.182) and a higher mean *CCC* (5.157) than high ESG firms, which have mean values of 8.353 and 3.854, respectively. These differences are statistically significant at the 1% level. The results also indicate that high ESG firms tend to be larger, with a mean *FS* of 9.495, compared to a mean *FS* of 9.075 for low ESG firms. Similarly, high ESG firms exhibit higher market risk, as indicated by a mean *Beta* (β) of 1.154, compared to 1.025 for low ESG firms. Governance differences are also evident, with high ESG firms having a larger average *BSIZE* of 7.540, compared to 6.741 for low ESG firms. In addition, CEO duality is more prevalent among high ESG firms, with a mean *CEODual* value of 0.122, compared to 0.083 for low ESG firms, with the difference being significant at the 5% level. These findings suggest that firms with high ESG generally have stronger governance structures, more efficient operational processes and fewer CCCs. These results support the hypothesis that higher ESG performance is associated with improved financial and operational metrics across firms.

To address concerns regarding multicollinearity, our study first examines the correlation matrix of the key variables. Table 3 reports Pearson's correlation coefficients between the variables in the regression analysis. As shown in the table, the correlations between independent and control variables are generally low, suggesting that multicollinearity is unlikely to affect our regression results. Specifically, ESG-related variables, such as *ESCORE*, *SSCORE* and *GSCORE*, exhibit relatively strong positive correlations with each other, with *ESCORE* and *SSCORE* having a correlation of 0.72, and *GSCORE* and *ESGC* having a correlation of 0.68. However, to avoid the potential multicollinearity issue, these variables are included separately in the model rather than being used together. Furthermore, the correlations between ESG scores and liquidity measures, such as *NWC*, *OCF* and *CCC*, align with our study's hypotheses. Specifically, ESG scores are positively correlated with *NWC*, while they are negatively correlated with OCF and CCC. To further investigate the potential multicollinearity issue, we use the variance inflation factor (VIF) values when estimating the regression models. The VIF values are all below 6, indicating that multicollinearity is not present (Liu *et al.*, 2023). As a VIF value above 10 signals significant multicollinearity, our study's results confirm that this is not the case. This analysis confirms that multicollinearity does not pose a significant threat to the validity of this study's regression results.

5.2 Regression analysis

This section discusses the relationship between ESG scores and liquidity measures, specifically *NWC*, *OCF* and *CCC*, after controlling for firm specificity. We regress liquidity measures on ESG scores and a set of control variables with year and industry fixed effects to account for changes in the economy and sector-specific factors (see Table 4). The regression results from 1,100 firm-year observations show that *ESGC* has a significantly positive relationship with *NWC* (0.013) at the 10% level, indicating that higher ESG scores are associated with improved working capital management. However, *ESGC* also has a significantly negative relationship with both *OCF* (−0.034) and *CCC* (−0.041) at the 1% significance level, suggesting that firms with higher ESG scores tend to experience lower OCF and lower CCCs. These findings support our hypotheses that ESG performance is positively (negatively) related to NWC (CCC and OCF).

Furthermore, our regression models show that control variables, such as *ROA*, *LVG* and *BSIZE*, play a significant role in liquidity management, with the results largely aligned with our expectations and findings from prior studies. For instance, the relationships observed between *ROA*, *LVG* and liquidity measures are consistent with findings in studies by Atif *et al.* (2022), Uyar *et al.* (2023) and Yu *et al.* (2018), while the positive association between

Table 3. Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	VIF
(1) *ESCORE*	1.00															4.12
(2) *SSCORE*	0.72	1.00														4.15
(3) *GSCORE*	0.58	0.52	1.00													2.76
(4) *ESGC*	0.77	0.81	0.68	1.00												4.37
(5) *NWC*	0.09	0.04	0.04	0.08	1.00											1.08
(6) *OCF*	−0.23	−0.18	−0.12	−0.22	0.04	1.00										1.21
(7) *CCC*	−0.33	−0.29	−0.21	−0.29	0.04	0.63	1.00									1.42
(8) *ROA*	−0.05	−0.01	−0.08	−0.02	0.19	−0.01	0.06	1.00								1.09
(9) *FS*	0.61	0.58	0.51	0.53	−0.20	−0.16	−0.25	−0.12	1.00							2.85
(10) *Beta*	0.01	0.04	0.01	0.01	0.10	0.02	0.03	−0.05	−0.13	1.00						1.02
(11) *FS*	0.02	0.10	0.07	0.07	−0.28	−0.2	−0.15	−0.12	0.21	0.06	1.00					1.26
(12) *DPR*	0.04	0.09	−0.02	0.05	−0.03	−0.02	−0.03	0.00	0.17	−0.07	0.14	1.00				1.10
(13) *BSIZE*	0.45	0.44	0.37	0.41	−0.16	−0.05	−0.11	−0.09	0.64	−0.01	0.13	0.17	1.00			2.24
(14) *CEODual*	0.04	0.05	−0.05	0.07	−0.04	−0.11	0.04	0.08	0.11	−0.17	−0.07	−0.01	0.07	1.00		1.05
(15) *COV*	−0.02	−0.02	0.01	−0.02	0.11	−0.07	−0.05	0.26	−0.04	−0.03	−0.18	−0.03	−0.07	0.10	1.00	1.08

Note(s): This table presents Pearson's correlation matrix showing the correlations between variables. All variables are defined in Appendix

Table 4. Ordinary least squares (OLS) regression results of ESG performance–liquidity relationship

Variables	*NWC* (Model 1)	*OCF* (Model 2)	*CCC* (Model 3)
ESGC	0.013* (1.89)	−0.034*** (−2.82)	−0.041*** (−2.98)
ROA	2.701*** (2.93)	−2.489 (−1.01)	0.669 (0.29)
FS	−0.478* (−1.80)	0.303** (2.22)	−0.563* (−1.79)
Beta	0.192 (1.37)	0.589** (1.98)	0.605* (1.89)
LVG	−1.409*** (−2.62)	−2.898** (−2.12)	−0.603 (−0.49)
DPR	0.382** (2.44)	0.060 (0.12)	−0.165* (−1.81)
BSIZE	−0.030** (−2.32)	0.096** (1.98)	0.247* (1.93)
CEODual	−0.289* (−1.82)	−2.117*** (−3.68)	0.625 (0.89)
COV	0.000 (0.30)	−0.002** (−2.10)	−0.003** (−2.15)
Intercept	5.599** (2.38)	9.002*** (2.70)	11.353*** (3.99)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
R^2	0.317	0.370	0.369
Observations	1100	1100	1100

Note(s): This table presents the OLS regression results of the ESG performance–liquidity association. All regressions are estimated with clustered robust standard errors by firm and include year and industry fixed effects, with *t*-statistics reported in parentheses. Superscript *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. All variables are defined in Appendix

board size and liquidity supports the arguments made by Manita *et al.* (2018). However, it is worth noting that some studies, such as Buallay (2019), suggest that factors other than sustainability reporting may also influence liquidity dynamics, highlighting the complexity of these relationships.

Our study provides evidence that ESG performance is an important factor influencing liquidity management. Higher ESG scores tend to improve working capital management but may lead to lower OCFs and slower CCCs.

5.3 Robustness tests and additional analyses

The robustness of the link between the ESG scores and cash flow management of ASX-listed companies is confirmed in this study after addressing sample selection bias, endogeneity, heterogeneity and simultaneous causality. Higher ESG scores correlate with optimised NWC, improved OCF and a reduced CCC. This finding demonstrates that strong ESG performance enhances financial efficiency, enabling better inventory, receivables and payables management. The findings affirm ESG's role in driving operational resilience and sustainable cash flow practices.

5.3.1 Heckman's model analysis. One of the key issues in this study is the potential for sample selection bias which arises when the focal outcome is observed only for a non-randomly selected sample. This could occur when firms with high ESG scores have unobserved traits that affect their liquidity outcomes, with these traits changing the representativeness of the sample. To address this concern, this study follows Heckman's (1979) approach and employs a two-stage model, as outlined in Table 5. In the first stage (Column 1), a probit regression model is applied as a selection equation, in which the dependent variable (*ESG_DUM*) is a dummy variable equal to 1 if the firm's ESG score is available and 0 otherwise. The key determinants of a firm's propensity to engage in ESG initiatives are included, thus incorporating two instrumental variables – *Median-ESG (IV1)* and *First-ESG (IV2)* – alongside the control variables used in our baseline model. Subsequently, the inverse Mills ratio (*IMR*) is calculated from the first stage and

Table 5. Heckman's (1979) Two-stage model analysis

Variables	First stage ESG_DUM	Second stage NWC	OCF	CCC
ESGC		0.014* (1.87)	−0.033*** (−2.70)	−0.041*** (−3.01)
ROA	0.914** (2.35)	3.125** (2.05)	−0.149** (−2.05)	−0.918** (−2.34)
FS	0.653*** (2.95)	−0.202* (−1.77)	1.824** (2.40)	−1.595*** (−2.85)
Beta	0.396** (2.40)	0.347 (0.74)	1.443* (1.93)	0.026*** (3.04)
LVG	−0.202** (−2.21)	−1.587*** (−2.74)	−3.880*** (−2.63)	0.063 (0.04)
DPR	0.038* (1.70)	0.394** (2.34)	0.127 (0.26)	−0.210** (−2.42)
BSIZE	0.034** (2.08)	−0.005** (−2.05)	0.231** (2.13)	0.155** (2.02)
CEODual	0.384* (1.72)	−0.094** (−2.17)	−1.043*** (−3.87)	−0.104*** (−2.99)
COV	−0.007*** (−3.21)	0.008 (0.24)	−0.002** (−2.44)	−0.002** (−2.00)
Median-ESG (IV1)	0.580*** (12.07)			
First-ESG (IV2)	0.501*** (17.17)			
IMR		0.541* (1.88)	0.513* (1.81)	0.521* (1.81)
Intercept	−1.317 (−0.91)	10.118*** (6.02)	9.817*** (5.76)	10.163*** (10.03)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
R^2/Pseudo R^2	0.443	0.749	0.749	0.745
Observations	3360	1100	1100	1100

Note(s): This table presents the results from Heckman's (1979) two-stage model. The first stage is the probit regression model with a dependent variable (*ESG_DUM*) that equals 1 if the firm has ESG scores available, and 0 otherwise. We include the key determinants of a firm's propensity to engage in ESG initiatives, incorporating Two instrumental variables – *Median-ESG (IV1)* and *First-ESG (IV2)* – alongside the control variables used in our baseline model. The second stage is the baseline regression model which includes the inverse Mills ratio (*IMR*) to control for selection bias. All regressions are estimated with clustered robust standard errors by firm and include year and industry fixed effects, with *t*-statistics reported in parentheses. Superscript *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. All variables are defined in Appendix

included as an additional control variable in the second stage. In the second stage, baseline regression models are estimated for the liquidity outcomes (i.e. *NWC*, *OCF* and *CCC*). All regressions are estimated with clustered robust standard errors by firm and include year and industry fixed effects. The results show that the coefficient of *IMR* is significantly positive, suggesting the presence of sample selection bias. The estimates in the second stage show that our baseline results are slightly more positive after considering sample selection bias. Thus, the main findings remain robust after accounting for potential sample selection bias.

5.3.2 Propensity score matching analysis. To address this concern, we use PSM, as outlined by Rosenbaum and Rubin (1983), to match firms with high ESG scores (treated group) and those with low ESG scores (control group) within the same industry and year. The first stage uses a logit model to perform nearest-neighbour matching within a 1% calliper with no replacement, as shown in Table 6. The second stage uses OLS regressions on the matched sample based on propensity scores to understand whether *ESGC* affects CLM measurements (*NWC*, *OCF* and *CCC*). The results show that *ESGC* has a statistically significant negative effect on both *OCF* and *CCC* after the second stage. The coefficients, respectively, are −0.039 (significant at the 1% level) and −0.029 (significant at the 5% level). Moreover, *ESGC* also has a marginally positive effect on *NWC*, with a coefficient of 0.013, which is significant at the 10% level. These findings suggest that ESG performance is positively associated with improved CLM. To validate the matching procedure, no

Table 6. Propensity score matching (PSM) analysis

Variables	First stage		Second stage	
	High_ESG	NWC	OCF	CCC
ESGC		0.013* (1.75)	−0.029** (−2.16)	−0.039*** (−2.76)
ROA	1.572* (1.400)	2.954** (2.49)	1.250*** (3.44)	3.168*** (3.08)
FS	1.063*** (6.700)	−0.636* (−1.85)	−0.168** (−2.37)	−0.385* (−1.97)
Beta	0.526*** (3.900)	0.182*** (3.14)	0.534** (2.40)	0.618* (1.73)
LVG	−0.620*** (−3.350)	−1.411** (−2.40)	−1.695*** (−3.24)	−1.368** (−2.01)
DPR	0.022* (1.820)	0.457*** (2.76)	−0.114* (−1.71)	0.133** (2.29)
BSIZE	0.099* (1.790)	0.009 (0.16)	0.335** (2.14)	0.179** (2.18)
CEODual	0.672** (2.480)	−0.415* (−1.77)	−2.233*** (−3.98)	0.624 (0.71)
COV	0.000 (−0.3)	0.001** (2.34)	−0.003*** (−3.16)	−0.004*** (−2.83)
Intercept	−11.556*** (−7.70)	6.527** (2.46)	11.582*** (3.12)	7.282** (2.16)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
R^2/Pseudo R^2	0.129	0.430	0.440	0.415
Observations	1100	624	624	624

Variables	Treated	Control	*p*-value
Panel B – mean test of treatment and control groups			
ROA	0.074	0.073	0.856
FS	9.350	9.249	0.105
Beta	1.080	1.168	0.084
LVG	0.498	0.486	0.414
DPR	0.545	0.529	0.686
BSIZE	7.234	7.122	0.468
CEODual	0.112	0.106	0.798
COV	29.521	32.676	0.729

Note(s): This table presents the regression results of the effect of ESG scores on liquidity using the propensity-matched sample. In the first stage, a logit model was used to match firms with higher ESG scores (treated) and those with lower ESG scores (control) with the same industry and year using nearest neighbour, within a 1% calliper and no replacement matching algorithms. The second stage presents OLS regression results using the propensity-matched sample from the first stage. All regressions in Panel A are estimated with clustered robust standard errors by firm and include year and industry fixed effects, with *t*-statistics reported in parentheses. Superscript *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. Panel B presents the mean differences between treated and control firms as a post-match diagnostic test. All variables are defined in Appendix

significant differences are shown in Panel B between the treated and control groups in terms of the key firm characteristics, confirming the robustness of the matching algorithm.

5.3.3 Robustness to endogeneity. Endogeneity arises when a two-way relationship is present between independent and dependent variables, potentially leading to biased estimates. In this study, endogeneity concerns stem from the possibility that ESG scores and liquidity management practices simultaneously influence each other. To address this, a 2SLS model is used to examine the link between ESG scores and liquidity management, while accounting for endogeneity (Semykina and Wooldridge, 2010). Two instrumental variables are employed: *Median-ESG (IV1)*, representing the industry-year median of ESG scores, and *First-ESG (IV2)*, corresponding to the ESG score when a firm first entered the sample. In the first stage, both instruments are highly significant, with positive coefficients of 0.580 and 0.501 (both at 1% level of significance), respectively, confirming their predictive power for ESG scores. In the second stage, ESG scores are found to positively impact *NWC* (0.016),

while negatively affecting *OCF* (−0.038) and *CCC* (−0.040) (all at 1% level of significance), indicating that higher ESG scores enhance liquidity management efficiency.

The validity of the instrumental variables is assessed using Hansen's J statistic (Hansen, 1994), while an endogeneity test examines whether endogeneity is present. Hansen's J statistic, which tests the null hypothesis that the instrumental variables are valid and uncorrelated with the error term, yields values of 0.140, 0.165 and 0.014 across the three models (i.e. *NWC*, *OCF* and *CCC*). These small and statistically insignificant values indicate that the instruments *Median-ESG (IV1)* and *First-ESG (IV2)* are appropriately selected and do not suffer from overidentification issues. In addition, the endogeneity test, which examines whether the endogenous regressor (*ESGC*) can be treated as exogenous, produces *p*-values of 0.326, 0.500 and 0.915, respectively. These high *p*-values suggest that *ESGC* does not exhibit significant endogeneity concerns, implying that the observed relationship between ESG performance and liquidity management is unlikely to be driven by reverse endogeneity. The result of the 2SLS is shown in Table 7.

5.3.4 Alternative measure of corporate liquidity management. To ensure the robustness of our study's findings, we re-estimate the baseline regression model using three alternative measures of CLM: the current ratio (*CR*), average payment period (*APP*) and average collection period (*ACP*) (Habib and Dalwai, 2024). These measures capture various aspects of liquidity management, providing a different assessment of how firms handle their cash flows. We regress these liquidity measures on ESG scores and a set of control variables, employing robust standard errors clustered by firm and including year and industry fixed effects. Table 8 presents the OLS regression results for a sample of 1,100 firm-year observations for *CR* and, for *APP* and *ACP*, for a sample of 1,032 firm-year observations. A positive relationship is found between the ESG scores and *CR*, with a coefficient of 0.005 (*t*-statistic = 2.35; at a 5% level of significance). This means that higher ESG scores are linked more to current assets than to current debt. The ESG scores have a negative relationship with the average collection period (*t*-statistic = −1.71). Thus, a higher ESG score is linked to a firm having shorter periods in which to collect payments from its customers. In contrast, ESG scores have a positive effect on average payment period (*APP*), with a coefficient of 0.018 (*t*-statistic = 1.99, at a 5% level of significance), suggesting better liquidity management when a firm has a higher ESG score.

5.3.5 Additional analysis. In a further robustness check, our study uses firm fixed-effects models to control for unobserved heterogeneity. Table 9 reveals that higher ESG scores are positively associated with *NWC*, with a significant coefficient of 0.014 (*t*-statistic = 4.59), indicating that firms excelling in ESG practices tend to maintain higher levels of working capital. We also find that, in relation to *OCF* and *CCC*, ESG scores are negatively and statistically significant. These findings reinforce our study's main findings and ensure their robustness after addressing another model specification. This outcome may occur as firms with strong ESG performance prioritise sustainable investments and risk mitigation which could lead to having increased working capital as a buffer against uncertainty.

Table 10 presents the OLS regression results for 1,100 firm-year observations, focusing on the individual dimensions of ESG scores – environmental (*ESCORE*), social (*SSCORE*) and governance (*GSCORE*) – to explore their distinct impacts on *NWC*, *OCF* and *CCC*, that is, the liquidity management metrics. This analysis is essential for understanding how each ESG dimension contributes to financial efficiency and working capital management. The findings reveal a positive and significant relationship between *ESCORE* and *NWC* at the 1% level of significance, indicating that stronger environmental practices enhance working capital. However, in terms of *OCF* and *CCC*, *ESCORE* shows a negative and significant relationship, suggesting potential short-term cash flow inefficiency due to sustainability-

Table 7. Robustness to endogeneity: Two-stage least squares (2SLS) model

	First stage	Second stage		
Items	ESGC	NWC	OCF	CCC
ESGC		0.016*** (3.42)	−0.038*** (−3.28)	−0.040*** (−3.61)
ROA	5.816 (1.12)	2.642*** (4.10)	−2.392** (−2.35)	0.664* (1.69)
FS	5.798*** (7.01)	−0.502*** (−3.97)	0.342** (2.29)	−0.565*** (−2.59)
Beta	0.638 (1.01)	0.182** (2.38)	0.606*** (3.15)	0.604*** (3.08)
LVG	−7.092*** (−3.36)	−1.396*** (−4.64)	−2.920*** (−3.73)	−0.602** (−2.01)
DPR	0.123 (0.12)	0.377*** (3.24)	0.068** (2.23)	−0.165*** (−2.73)
BSIZE	0.309 (1.19)	−0.032** (−2.15)	0.100** (2.09)	0.246*** (2.97)
CEODual	5.714*** (3.45)	−0.294** (−2.32)	−2.109*** (−5.57)	0.624** (2.22)
COV	−0.001 (−0.24)	0.000** (2.43)	−0.002*** (−2.64)	−0.003*** (−3.16)
Median-ESG (IV1)	0.580*** (12.07)			
First-ESG (IV2)	0.501*** (17.17)			
Intercept	−78.921*** (−11.10)	5.753*** (5.35)	8.749*** (3.77)	11.365*** (4.91)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Corr. of (*IV1*)	0.650			
Corr. of (*IV2*)	0.709			
Hansen J statistic		0.140	0.165	0.014
Endogeneity test		0.326	0.500	0.915
R^2/Pseudo R^2	0.509	0.316	0.370	0.369
Observations	1100	1100	1100	1100

Note(s): This table presents the results of the association between ESG scores and liquidity management using a Two-stage least squares (2SLS) model. The instrumental variables are: (1) *Median-ESG (IV1)*, which is the industry-year median of *ESG*, and (2) *First-ESG (IV2)*, which is *ESG* at the first time the firm entered the sample. Hansen's J statistic is a test under the null hypothesis that the instruments are valid. The endogeneity test is carried out under the null hypothesis that the specified endogenous regressors can be treated as exogenous. All regressions are estimated with clustered robust standard errors by firm. The *t*-statistics are reported in parentheses. Superscript *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. Appendix presents the definitions of the variables and their sources

Table 8. Alternative measurements

Variables	*CR*	*ACP*	*APP*
ESGC	0.005** (2.35)	−0.011* (−1.71)	0.018** (1.99)
ROA	0.987* (1.66)	−4.553*** (−3.65)	−2.819** (−2.55)
FS	0.084** (2.40)	−0.793*** (−2.82)	0.690** (2.52)
Beta	−0.139** (−2.01)	0.018** (2.12)	−0.064*** (−3.29)
LVG	−2.402*** (−9.48)	0.505*** (2.80)	0.275 (0.36)
DPR	0.027** (2.32)	0.039** (2.14)	0.452* (1.75)
BSIZE	−0.027*** (−4.10)	0.195*** (2.69)	−0.170** (−1.98)
CEODual	−0.291*** (−2.71)	−0.447** (−2.41)	−2.708*** (−6.87)
COV	0.000 (0.91)	−0.002*** (−3.99)	0.000 (0.52)
Intercept	1.850*** (2.76)	15.242*** (5.26)	2.077 (0.60)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
R^2	0.352	0.461	0.312
Observations	1100	1032	1032

Note(s): This table presents the baseline model using alternative measurements. The *t*-statistics are reported in parentheses. Superscript *, ** and ***indicate significance at 10, 5 and 1% levels, respectively. All variables are defined in Appendix

Table 9. Firm fixed-effects models

Variables	*NWC*	*OCF*	*CCC*
ESGC	0.014*** (4.59)	−0.046* (−1.71)	−0.089** (−2.07)
ROA	0.667** (2.11)	−1.617** (−2.04)	0.216*** (3.13)
FS	−0.256* (−1.86)	−0.876** (−2.47)	−0.664* (−1.72)
Beta	−0.050* (−1.87)	−0.450** (−2.32)	0.095** (2.45)
LVG	−1.672*** (−6.21)	−0.432 (−0.62)	2.441*** (3.24)
DPR	0.190** (2.02)	0.172* (1.71)	0.245* (1.93)
BSIZE	−0.041* (−1.88)	−0.244*** (−2.94)	0.032*** (3.35)
CEODual	−0.384* (−1.93)	−1.084** (−2.12)	0.042 (0.08)
COV	0.001** (1.99)	−0.001** (−2.14)	−0.000 (−0.48)
Intercept	3.742*** (2.96)	20.343*** (6.27)	10.219*** (2.90)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
R^2	0.317	0.370	0.369
Observations	1100	1100	1100

Note(s): This table presents the firm fixed-effects regressions (within firm). The *t*-statistics are reported in parentheses. Superscript *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. All variables are defined in Appendix

related investment. Similarly, *SSCORE* exhibits a positive but marginally significant (10% level) relationship with *NWC*, reflecting the trade-offs of social responsibility initiatives that may boost reputation and stakeholder satisfaction but at the cost of reduced cash flow efficiency. In contrast, *GSCORE* demonstrates a positive yet insignificant relationship with liquidity metrics, implying that governance improvements have a weaker direct impact on liquidity than environmental or social factors. Overall, this dimension-level analysis reinforces our study's main results, highlighting that, while individual ESG dimensions contribute to improved *NWC*, they may also lead to trade-offs in cash flow efficiency. These findings underscore the complexity of balancing sustainability efforts with financial performance and align with the broader trends observed in our study.

6. Discussion

This study empirically investigates the relationship between corporate ESG scores and CLM. Specifically, we examine the impact of ESG performance on key liquidity metrics, such as NWC, the CCC and OCF, using a data set of 1,100 ASX-listed companies' firm-year observations spanning 2010–2023. We find that higher ESG scores are positively associated with higher NWC (*H1*) but negatively associated with the CCC (*H2*) and OCF (*H3*). Our study began by conducting univariate analysis and then proceeded to multivariate analysis using OLS regression models, while controlling for a set of firm-level variables. To address potential concerns, such as sample selection bias, heterogeneity and endogeneity, we used several alternative model specifications: Heckman's (1979) two-stage approach; PSM analysis; 2SLS regression analysis; and firm fixed-effects models. Our study's main results are found to be robust to these concerns and continue to hold across alternative specifications and various tests.

This study's findings offer significant insights into how firms' ESG performance can impact liquidity management, with notable implications for financial management, policy makers, creditors and investors. The results suggest that firms with higher ESG scores may leverage an enhanced reputation to achieve better liquidity management which helps to

Table 10. Environmental, social and governance (ESG) dimensions analysis

Items	*NWC*	*NWC*	*NWC*	*OCF*	*OCF*	*OCF*	*CCC*	*CCC*	*CCC*
ESCORE	0.01*** (2.68)			−0.04*** (−3.42)			−0.04*** (−3.55)		
SSCORE		0.01 (1.53)			−0.02* (−1.72)			−0.04*** (−3.16)	
GSCORE			0.01* (1.96)			−0.02 (−1.51)			−0.01 (−1.13)
ROA	2.68*** (2.80)	2.73*** (2.94)	2.92*** (2.78)	−2.44** (−2.01)	−2.75** (−2.08)	−3.12** (−2.29)	0.77* (1.84)	0.84*** (3.35)	−0.12** (−2.05)
FS	−0.54* (−1.74)	−0.47** (−2.46)	−0.47*** (−3.43)	0.46*** (3.87)	0.21** (2.43)	0.19** (2.39)	−0.35*** (−3.00)	−0.46** (−2.41)	−0.75* (−1.83)
Beta	0.18** (2.35)	0.21** (2.55)	0.21** (21.37)	0.61** (2.05)	0.52* (1.74)	0.52* (1.69)	0.64* (1.97)	0.60* (1.89)	0.50 (1.57)
LVG	−1.41*** (−2.73)	−1.48*** (−2.82)	−1.44*** (−2.69)	−2.89** (−2.16)	−2.72** (−2.00)	−2.80** (−2.06)	−0.60** (−2.11)	−0.39 (−0.33)	−0.46*** (−3.37)
DPR	0.38** (2.47)	0.35** (2.40)	0.41** (2.44)	0.05*** (4.11)	0.10*** (3.20)	−0.00 (−0.00)	−0.17** (−2.42)	−0.03* (−1.66)	−0.24 (−0.58)
BSIZE	−0.05** (−2.02)	−0.03** (−2.58)	−0.02** (−2.48)	0.14*** (3.91)	0.08** (2.49)	0.07 (0.46)	0.31** (2.44)	0.25* (1.96)	0.22 (1.62)
CEODual	−0.22*** (−3.02)	−0.27*** (−3.23)	−0.16 (−0.73)	−2.30*** (−3.79)	−2.17*** (−3.48)	−2.37*** (−3.45)	0.41* (1.85)	0.57*** (3.80)	0.38** (2.45)
COV	0.05** (2.33)	0.07*** (3.26)	0.08 (0.17)	−0.04** (−2.20)	−0.01* (−1.94)	−0.01* (−1.92)	−0.09** (−2.33)	−0.02** (−2.13)	−0.07* (−1.91)
Intercept	6.42*** (2.62)	5.81** (2.26)	5.33** (2.24)	6.91* (1.88)	9.17*** (2.76)	10.07*** (2.99)	8.65*** (3.07)	9.80*** (3.60)	12.90*** (4.28)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.33	0.31	0.31	0.38	0.36	0.36	0.38	0.37	0.35
Observations	1100	1100	1100	1100	1100	1100	1100	1100	1100

Note(s): This table presents the baseline model by using the ESG pillars as alternative measurements. The *t*-statistics are reported in parentheses. Superscript *, ** and *** indicate significance at 10, 5 and 1% levels, respectively. All variables are defined in Appendix

reduce operational inefficiency. This challenges the notion that ESG practices are merely a cost or a burden for firms. Therefore, firms can improve their liquidity by enhancing their ESG practices which, in turn, may improve their firm value. Our study contributes to the broader discourse on corporate governance and ESG practices. This finding provides additional insights for policy makers at the firm level with its suggestion that encouraging firms to engage in ESG activities could lead to both direct and indirect benefits, including improved financial management practices. Firms that actively address ESG concerns are likely to experience a reduction in operational costs and a more stable cash flow, thus contributing to their overall financial resilience. Therefore, fostering ESG initiatives could help to secure firms' financial stability, while also contributing to broader environmental and social goals.

Comparing our results with studies from other countries, we find consistency with previous research. For instance, European firms with higher *ESG* scores were found to maintain better liquidity and reduce cash flow risks, as reported by Saleh *et al.* (2025). Similarly, studies in China (Chen and Xie, 2022) and India (Mondal and Sahu, 2025) indicate that strong *ESG* performance positively influences NWC and operational efficiency, aligning with our findings. However, some studies in emerging economies, such as those by Oyewo (2023) in African markets, show that while *ESG* improves stakeholder trust, liquidity outcomes may be more sensitive to institutional frameworks, suggesting regional differences in *ESG–CLM* effectiveness. Overall, our results corroborate the international evidence that *ESG* practices enhance liquidity management, while also highlighting contextual variations across different regulatory and economic environments.

7. Conclusion

This study empirically examined the relationship between corporate ESG scores and CLM using a sample of 1,100 ASX-listed firm-year observations spanning 2010–2023. The findings demonstrate that higher ESG scores are positively associated with NWC and negatively associated with the CCC and OCF, supporting all three hypotheses. These results remain robust across multiple econometric specifications addressing selection bias, endogeneity and heterogeneity. Beyond the financial and theoretical implications discussed in Section 6, the findings carry important societal implications that warrant explicit recognition. Firms that maintain sound liquidity through responsible ESG practices are better positioned to honour their social licence to operate during periods of economic stress. This social licence – conferred informally by the broader community, employees and stakeholders – depends critically on a firm's ability to sustain operations, preserve employment and fulfil contractual obligations to suppliers and creditors even during adverse conditions. By maintaining adequate liquidity through strong ESG performance, firms reduce the risk of abrupt operational failures that impose negative externalities on employees (through job losses), local communities (through economic disruption) and supply chain partners (through payment delays or contract terminations). ESG-driven liquidity management should therefore be recognised as a proactive measure to mitigate negative social externalities, aligning a firm's financial health with broader stakeholder interests. In the Australian context, where mandatory climate-related financial disclosure requirements now apply to ASX-listed firms, firms that proactively align their financial health with stakeholder interests through ESG practices contribute to the broader goals of sustainable economic development and social stability, in line with the United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 17 (Partnerships for the Goals).

This study presents important theoretical implications for understanding the determinants of CLM. Firstly, the results are consistent with stakeholder theory, which suggests that firms that effectively manage relationships with key stakeholders – such as employees, customers, suppliers, regulators and capital providers – are more likely to achieve superior operational and financial outcomes. Strong ESG performance enhances stakeholder trust and cooperation, which improves working capital efficiency and, in turn, has a positive effect on NWC, OCF and CCC.

Secondly, the findings provide empirical support for signalling theory by showing that ESG performance and disclosure act as credible signals of firm quality, transparency and effective risk management. These signals reduce information asymmetry between firms and external stakeholders, particularly investors and creditors, thereby improving access to external finance and lowering financing costs. As a result, firms with stronger ESG performance face fewer liquidity constraints and are able to manage liquidity more efficiently, rather than relying on excessive precautionary cash holdings. Despite these valuable contributions, this study had several limitations. Our data are restricted to firms within the ASX index; therefore, the findings may not be generalisable to firms outside this region or those operating in different institutional contexts. In addition, some ESG metrics used in this study may have limitations in terms of their ability to fully capture the breadth of ESG factors that could impact liquidity. Future research may benefit from using more granular or industry-specific ESG data to further refine these measurements.

Future research should also focus on developing standardised ESG metrics and on examining the long-term effects of ESG practices on liquidity risk (Pedersen *et al.*, 2021). As ESG metrics continue to evolve, they will play an increasingly important role in shaping firms' financial strategies and risk management practices.

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Appendix

Table A1. Definitions and sources of variables

Variable code	Description	References
Dependent variables		
NWC	Net working capital, calculated as the difference between current assets and current liabilities	Baños-Caballero *et al.* (2014); Sikveland and Zhang (2020); Vlismas (2024)
CCC	Cash conversion cycle, the time to convert inventory investments into cash, including inventory, receivables, and payables periods	Johan *et al.* (2024)
OCF	Operating cash flow, the time from inventory acquisition to cash receipt from sales, covering inventory and receivables periods	Kouaib and Bu Haya (2024)
CR	Current ratio, calculated as current assets, divided by current liabilities	Hertina *et al.* (2021)
APP	Average payment period, representing the average number of days taken to pay accounts payable	Amponsah-Kwatiah and Asiamah (2021)
ACP	Average collection period, the average number of days it takes for a firm to collect payments from its customers after a sale	Amponsah-Kwatiah and Asiamah (2021)
ESG variables		
ESCORE	Environmental score, representing the firm's environmental performance, including sustainability initiatives	Chen and Xie (2022); Friede *et al.* (2015)
SSCORE	Social score, representing a firm's social performance, including labour practices and customer relations	Chen *et al.* (2023); Manita *et al.* (2018);
GSCORE	Governance score, assessing the firm's governance practices, such as board structure and compliance	Chen *et al.* (2023)
ESGC	Combined ESG score, combining environmental, social and governance factors into a holistic score	Cheng *et al.* (2024)
Control variables		
FS	Firm size, measured by total assets or market capitalisation, indicating the scale of the firm	Elamer and Boulhaga (2024)
LVG	Leverage, calculated as the ratio of total debt to equity, reflecting financial structure	Elamer and Boulhaga (2024)
COV	Coverage, calculated as income before extraordinary items plus interest expenses divided by interest expenses	Issa (2023)
Beta (β)	Systematic risk beta, indicating a stock's volatility relative to market volatility, based on monthly returns	Husna and Satria (2019)
ROA	Return on assets, calculated as net income divided by total assets, indicating asset efficiency	Abusharbeh *et al.* (2023); Husna and Satria (2019)
DPR	Dividend payout ratio, representing the percentage of earnings paid out as dividends	Husna and Satria (2019)
BSIZE	Board size, the total number of directors on the board at the fiscal year's end	Elamer and Boulhaga (2024); Issa (2023)

(*continued*)

Table A1. Continued

Variable code	Description	References
CEO	CEO duality, equal to 1 if the CEO is also the chairman of the board, and 0 otherwise	Elamer and Boulhaga (2024); Issa (2023)
First-ESG	*ESGC* score for a firm when it is first entered in the sample	
Median-ESG	Dummy variable equals 1 if the firm is higher than or equal to the industry *ESGC* median, and 0 otherwise	

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