

Green Accounting Practices, Corporate Social Responsibility and Corporate Financial Performance: Unpacking the Mediating and Moderating Mechanisms in an Emerging Economy

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ABSTRACT: There is, however, discussion of an environmental accounting–firm performance relationship in sustainability finance research, especially in emerging economies where disclosure norms and institutional pressures are significantly distinct from those in developed economies. This study aims to provide a comprehensive empirical analysis on the effects of green accounting practices (GAP) on corporate financial performance (CFP) for non-financial year listed companies on Pakistan Stock Exchange (PSX) during 2015–2023 period. Based on an integrated theoretical perspective, which is based on Stakeholder theory and Institutional theory along with the resource based view (RBV) literature, the study suggests that corporate social responsibility (CSR) is a mediate chain in converting GAP into positive financial results, and corporate governance quality (CG) is a boundary condition that further intensifies the mediate chain. To deal with the endogeneity issue, PSX-listed non-financial firms data is pooled together to analyze the panel using System Generalized Method of Moments (System GMM) estimator in addition to Baron and Kenny mediation procedure and Sobel–Aroian bootstrapped indirect effects test. Moreover, the moderated Mediation pathway is tested by the help of the PROCESS

macro Model 14. Results indicate that both direct and indirect effects of GAP have a significant and positive impact on CFP. More importantly, the quality of corporate governance (QoC) enhances the relationship between GAP–CSR linkage as the better the corporate governance structure, the more benefit that the CSR activities based on the information of green accounting disclosure of companies will bring them, which in turn will yield better financial performance. A sector level heterogeneity analysis finds effects are most prominent in energy intensive sectors. Originality/value of the study is this study: (i) introduces green accounting as a strategic institutional signal beyond a mere compliance mechanism; (ii) formal testing of conditionality of CSR mediation under different governance regimes; and (iii) provides the first multi-year, large-sample GMM based evidence on the above framework in Pakistan. The findings have direct implications for the Securities and Exchange Commission of Pakistan (SECP), PSX ESG framework developers, institutional investors, and corporate sustainability managers.

Keywords: *Green Accounting Practices (GAP); Corporate Social Responsibility (CSR); Corporate Financial Performance (CFP); Corporate Governance (CG); System GMM; Pakistan Stock Exchange (PSX); Sustainability Disclosure (SD); Emerging Markets; ESG Integration; Moderated Mediation Model.*

1. Introduction

Environmental accounting has passed from the fringes to the mainstream of corporate strategy, driven by the growing sense of urgency in the global climate commitments; a surge in sustainability reporting standards and demands from investors around measures of non-financial performance. Green accounting practices (GAP), which integrate environmental costs and liabilities, specific valuations of environmental assets, and disclosure of environmental issues into corporate financial reporting and decision making systems, have become at the heart of how firms put their environmental policies in action. However, the empirical literature on the effectiveness of and implementation of such practices in achieving better financial results is incomplete and inhomogeneous in both quality and context, with a strong focus on high income country settings (Schaltegger & Burritt, 2017; Huang & Watson, 2015). Pakistan is a case in point that is especially instructive to examine these dynamics.

Pakistan is currently at a critical turning point in its sustainability reporting saga, amidst its rapidly changing regulatory landscape, featuring the Securities and Exchange Commission of Pakistan's (SECP) Corporate Governance Code 2023, the Pakistan Stock Exchange's (PSX) ESG Reporting Framework and the State Bank of Pakistan's (SBP) Green Banking Guidelines. Despite the ambiguity over the disclosure of environmental and social performance information (ESPI) and a lack of uniform standards, non-financial companies listed on the PSX are increasingly facing institutional pressure from regulators, foreign investors and multilateral development partners (MDPs) to provide such information. However, the business rationale behind voluntary use of green accounting is still under-explicit in the Pakistani academic literature, and therefore, no empirical evidence is available for the financial benefits of investments in sustainability. This study is driven by two structural gaps.

First, a few studies have explored the link between sustainability and financial performance in Pakistan, but few have explored the issue of green accounting as an antecedent of the relationship and CSR implementation as a precursor to CSR and financial performance. Second, the conditioning role of corporate governance has been extensively theorized on the studies of the developed markets but not much work has been done on the environmental accounting-CSR nexus in emerging economies where corporate governance quality is less uniform and enforcement systems are less robust.

To fill in these gaps, in this paper a new moderated mediation model is developed, where GAP impacts CFP via the sequential mediations of CSR engagement and the corporate governance quality moderates the strength of GAP to CSR path. The study presents robust, policy relevant evidence, on these mechanisms, based on an environmental and CSR disclosure data collected by the researcher from PSX annual reports and sustainability disclosures of 180 companies for a 9-year period (2015 - 2023) and by accounting for dynamic endogeneity using the System GMM. The theoretical combination between institutional theory and stakeholder theory and RBV is also another contribution, because it embodies coercive, normative and mimetic pressure that influences companies' sustainability disclosure performance in the new framework of an emerging economy regulatory environment.

The rest of the paper is organized as follows: Section 2 presents a review of theory and empirical literature. Section 3 develops hypotheses. Section 4 explains the data, variables and econometric approach. The empirical results are given in Section 5. Here sections 6 and 7 present some findings and contributions. Policy implications and directions for future research are provided in Section 8. The chapter presents a literature review and a theoretical basis for conducting the study.

2. Literature Review and Theoretical Foundations

2.1 Theoretical Underpinnings

This study draws on and brings together three related theoretical perspectives. The first theory, stakeholder theory argues that the firm produces value by engaging in a variety of relationships with its various stakeholder groups (Freeman, 1984), including shareholders, employees, communities, regulators, and the environment. Green accounting is therefore is a tool to make the environmental costs and impacts visible, and consequently this information asymmetry between the firm and its stakeholders is reduced (Clarkson et al., 2011). Credible environmental disclosure by stakeholders can help increase their willingness to grant legitimacy, lower their risk premiums, and supply preferential financing.

Second, institutional theory (DiMaggio & Powell, 1983; Scott, 1995) adds value to the model in understanding the extent of institutional adoption of green accounting. The diffusion of environmental reporting practices takes place through three isomorphic processes: coercive pressure from policies (such as the governance codes of the SECP), normative pressure from industry norms (such as GRI and IFRS Sustainability), and mimetic pressure from imitation of peers. Important, however, there is the distinction of difference, with institutional theory arguing that firms facing heavier external scrutiny will react more strongly to institutional demands and thus increases in external demands, which are measured by greater disclosure, on average, should correspond to larger increases in CSR output.

Third, from a resource-based view (Barney, 1991; Hart, 1995), GAP is a means of strategic differentiation. Companies that adopt better environmental management, enable carbon cost accounting, recognise environmental liability and report on eco-efficiencies, build up

non-imitable competencies that lead to a lasting competitive advantage. Thus, CSR is more than the result of environmental responsibility; it is also a tool or a lever for the recruitment of high-value customers and high-quality hires and reduces regulatory compliance expenses.

2.2 Green Accounting Practices and Corporate Financial Performance

The green accounting – financial performance relationship has been studied from various theoretical and empirical aspects. The willingness to disclose environmental information was found in an initial study by Clarkson et al., (2011) to be related positively to quality of environmental performance, implying that the credibility of environment disclosures is of significance. Within a European sample, companies that disclose more carbon data have been linked to higher risk-adjusted returns, as well as to lower cost of debt (Dhaliwal et al., 2011; Cheng et al., 2014).

The Asian emerging market view is supported by evidence from China, which shows that firms in green interim disclosure have greater ROA values than green non-disclosure firms with higher pollution levels, allowing for the impact of firm characteristics, such as growth, leverage, tangibility and concentration (Marquis & Qian, 2014). Based on a sample of PSX-listed manufacturing companies, Akhtar et al. (2019) in Pakistan reported that there exists a positive yet fragile direct link between ERQ and profitability of companies and the link was sensitive to firm size and sectoral makeup of companies. However, the channels and processes by which environmental reporting leads to financial rewards are largely not discussed in the domestic literature, and most studies estimate these channels by using linear (usually OLS) regressions which are methodologically flawed because of the well-documented simultaneity between firm performance and disclosure decisions.

2.3 The Mediating Role of CSR

Corporate social responsibility is the action of businesses that reflects their commitment to the welfare of the stakeholders and the actions that included environmental responsibility, employee welfare, community involvement, and ethical management. The CSR – financial performance relationship is probably one of the most studied relationships in the management literature and meta analyses have consistently shown a positive average effect

size (Orlitzky et al., 2003; Margolis et al., 2009). Overall, however, critical is making CSR an effective financial performance driver that can only happen when CSR is bound with credible, recognized practices institutionalized by the accounting departments, which happens in green accounting.

The logic of the transmission is intelligently experienced. Organizations that include environmental costs in their calculation and report such figures truthfully (GAP) are in a stronger position, when it comes to designing, measuring and reporting meaningful CSR initiatives. Such CSR activities, in turn, help to secure reputational benefits, ensure good relationships with different stakeholders, minimize litigation risks and benefit from socially responsible investors, thereby enhancing financial performance (Waddock & Graves, 1997; Margolis et al., 2009). This sequential pathway is the mediated pathway that was formalized in the framework for this study.

2.4 The Moderating Role of Corporate Governance

Corporate Governance refers to the process, systems and structures that guide and manage companies in a way that serves the interests of shareholders, boards, management and stakeholders (Jensen & Meckling 1976; Shleifer & Vishny 1997). Sustainability commitments are placed within an institutional framework which encourages accountability for good governance, such as board independence, the effectiveness of audit committee, the non-duality of the CEO, and dispersed ownership. However, Jo and Harjoto (2012) found that the CSR –performance link gets stronger if the company has good governance; it provides better monetary gains if the CSR is invested well. As this understanding leads to the green accounting context, we theorise a moderation effect between the GAP – CSR pathway: higher governance quality means that they are more likely to take environment-related disclosures and make them a reality by having stakeholder validated CSR programs and not symbolic decoupling, and therefore the effects down the stream on financial effects are likely to be stronger. This conditional indirect effect is the main moderated mediated pattern of the investigation.

2.5 Research Gaps and Study Positioning

Given this evidence there are still three important gaps. First, there is no study from Pakistan yet that has studied green accounting as a predictor of CSR and of financial

performance in a single GMM-based panel study. Second, the boundary conditions in which the creation of CSR value (Green Accounting) can be achieved or tested in terms of governance quality, have not been formally tested in the South Asian context. Thirdly, methodological limitations in previous studies (OLS with heteroscedasticity, cross-sectional studies, self-reported CSR data) create a weakness in causal inference. This study has removed all three limitations from a single set.

3. Hypotheses Development

Therefore, the following eight formal hypotheses exist based on the above theoretical and empirical foundations:

H1: there is a positive and significant direct effect of Green accounting practices (GAP) on Corporate financial performance (CFP) for PSX listed non-financial firms.

H2: Green accounting practices (GAP) significantly and positively influence on the level of commitment toward corporate social responsibility (CSR).

H3: Finally, we find that corporate social responsibility (CSR) has a positive and significant impact on corporate financial performance (CFP).

H4: CSR partly mediates the relationship between GAP and CFP, where the mediate effect between GAP and CFP through the CSR is positive and significant.

H5: Positive moderation effect of corporate governance quality (CG) on the relationship between green accounting practices (GAP) and corporate social responsibility (CSR) indicates that the impact of GAP–CSR is greater for the firms having higher corporate governance quality (CG).

H6: The indirect effect of gap on CFP through CSR is moderated by corporate governance quality (CG) (moderated mediation) in such a way that the relationship of gap with CFP via CSR is stronger for higher corporate governance quality (CG) firms.

H7: When in which size of the firm is included as a control variable, leverage and age, it positively moderates this relationship between gap and CSR.

H8: The positive impact of GAP on CFP is more noticeable in energy intensive sectors (manufacturing, energy and materials) than in other sectors.

4. Conceptual Framework

A moderated mediation model was the integrated model for this study (see Figure 1). The framework considers the practices of green accounting (GAP) as the initial independent variable that affects financial performance of the companies (CFP) directly as well as indirectly via CSR. Thus, corporate governance quality (CG) is included as a moderator of the GAP→CSR pathway and hence the indirect influence of GAP on CFP is conditional. The model draws on the three theories described above: stakeholder theory, stakeholder responsiveness as a rationale; institutional theory, the regulatory pressures which activate adoption of GAP; and RBV, the value creation pathway for strategic adoption.

[Figure 1: Moderated Mediation Conceptual Framework]

GAP → CSR (moderated by CG) → CFP; GAP → CFP (direct)

5. Research Methodology

5.1 Research Design and Philosophy

In this study research into the field of accounting/finance, a positivist research approach that utilizes a deductive approach and quantitative data is used, consistent with the epistemological standards of the field. We have chosen a longitudinal panel data that allows us to measure the variation in the cross-sections across different firms as well as the within firm variation over the study period, thus providing a more credible causal inference than the cross-sectional alternatives (Wooldridge, 2010).

5.2 Population, Sample, and Data Collection

The population of study is all the non-financial firms listed on Pakistan Stock Exchange (PSX). Finance companies (such as banks, insurance companies, DFIs and investment companies) are not included because of their unique regulatory and accounting relationships. To ensure a balanced panel, firms are excluded after the year 2015 and on delisting prior to 2023. This filtering results in 180 companies in 9 sectors and a well-balanced firm-year dataset for 2015–2023, totaling 1,620 firm-year observations. There are

various data repositories. The hand-collection of environmental and CSR disclosure data is based on a structured content analysis protocol from annual reports, sustainability reports and Directors' Reports. Data on financial performance and governance is taken from PSX data portal, Bloomberg Terminal and the financial statements database of Karachi stock exchange (KSE). Industry classification in accordance with Pakistan Standard Industrial Classification (PSIC).

5.3 Variable Operationalization

Table 1 summarizes all variables, their proxies, measurement approaches, and theoretical anchors.

Variable	Category	Proxy / Measure	Source	Reference
Green Accounting (GAP)	Independent	Environmental Disclosure Index (EDI): 45-item checklist (GRI G4 + TCFD); scored 0–1	Annual Reports (content analysis)	Clarkson et al. (2011)
CSR	Mediator	CSR Disclosure Index: 38-item index (GRI Standards); environmental, social, governance sub-pillars	Sustainability Reports / AR	Carroll (1991); GRI (2021)
Corp. Governance (CG)	Moderator	Composite index: Board Independence (%), Audit Committee Independence, CEO Duality (dummy), Ownership Concentration (HHI)	Annual Reports / PSX	Jensen & Meckling (1976)
Return on Assets (ROA)	Dependent	Net Income / Total Assets	Financial Statements	Orlitzky et al. (2003)
Return on	Dependent	Net Income /	Financial	Waddock &

Variable	Category	Proxy / Measure	Source	Reference
Equity (ROE)		Shareholders' Equity	Statements	Graves (1997)
Tobin's Q	Dependent	(Market Cap + Total Debt) / Total Assets	Bloomberg / PSX	Chung & Pruitt (1994)
Firm Size	Control	Natural log of Total Assets	Financial Statements	Firm size controls literature
Leverage	Control	Total Debt / Total Assets	Financial Statements	Capital structure literature
Firm Age	Control	Years since incorporation (log)	SECP / PSX	Life cycle theory
Profitability Lag	Control	Lagged ROA (t-1)	Financial Statements	Dynamic panel literature

Table 1. Variable Operationalization Summary

5.4 Measurement of the Environmental Disclosure Index (EDI)

To measure the Environmental Disclosure Index (EDI) The EDI is created by analyzing annual reports and sustainability reports systematically using a 45-item binary coding tool aligned with the reporting guidelines in GRI G4 Standards and the TCFD Recommendations. Items are organised under five thematic categories: (1) Environmental Policy and Management Systems (10 items); (2) Energy and Emissions Reporting (10 items); (3) Water, Waste and Biodiversity Disclosures (8 items); (4) Environmental Risk and Liability recognition (9 items); and (5) Green Capital Expenditure and Investment Disclosures (8 items). If the information is disclosed, a 1 point is given by each item, otherwise 0 points. For each firm in year t , the EDI is equal to items scored, divided by 45. A 20% random subsample of the data is double coded by two trained research assistants,

with a Cohen's kappa coefficient of 0.89, which suggests near perfect agreement (Landis & Koch, 1977).

5.5 Econometric Strategy

Since the panel structure and endogeneity issues, due to simultaneity between sustainability disclosures and financial measures, this study uses the System Generalized Method of Moments (System GMM) estimator developed by Blundell and Bond (1998). In dynamic panel data, System GMM is robust to unobserved firm heterogeneity and simultaneity bias which are serious problems with OLS, Fixed Effects, and Random Effects estimators using lagged levels or differences of endogenous variables as internal instruments.

The primary econometric specifications are as follows:

Equation 1 (Direct Effect):

$$CFP_{it} = \beta_0 + \beta_1 CFP_{it-1} + \beta_2 GAP_{it} + \beta_3 CSR_{it} + \beta_4 CG_{it} + \beta_5 Size_{it} + \beta_6 Lev_{it} + \beta_7 Age_{it} + \eta_i + \lambda_t + \varepsilon_{it}$$

Equation 2 (Mediation — Path a):

$$CSR_{it} = \alpha_0 + \alpha_1 GAP_{it} + \alpha_2 CG_{it} + \alpha_3 Size_{it} + \alpha_4 Lev_{it} + \alpha_5 Age_{it} + \eta_i + \lambda_t + \varepsilon_{it}$$

Equation 3 (Moderation — Interaction):

$$CSR_{it} = \gamma_0 + \gamma_1 GAP_{it} + \gamma_2 CG_{it} + \gamma_3 (GAP_{it} \times CG_{it}) + \gamma_4 Controls_{it} + \eta_i + \lambda_t + \varepsilon_{it}$$

CFP_{it} denotes financial performance of firm i at time t (measured by one of the following indices: ROA, ROE and Tobin's Q); GAP_{it} is the Environmental Disclosure Index; CSR_{it} is CSR Disclosure Index; and CG_{it} is the Corporate Governance composite index while ε_{it} denotes idiosyncratic error term. To check the robustness of estimator, the Arellano–Bond AR(2) test for second order serial correlation and Hansen–Sargan test for instrument validity are shown for all GMM specifications. The baselines are specific to the moderated mediation analysis using the PROCESS Macro Model 14 with 5,000 bootstrap iterations and 95% bias-corrected confidence intervals (BCCIs) to evaluate the conditional indirect effect of GAP on CFP at low (-1 SD), medium (mean), and high ($+1$ SD) scores of corporate governance.

6. Empirical Results

6.1 Descriptive Statistics

The descriptive statistics for all the study variables is presented in table 2. Results show that the average score on the Environmental Disclosure Index is 0.42 (SD = 0.18), suggesting that environmental disclosure is in the moderate range for PSX listed companies, and there is significant variation between industry sectors. With a CSR index mean of 0.38 (SD = 0.16), Pakistan's situation of structured CSR reporting suggests that while the process is still in its early stages, it is beginning to take shape. The results of mean ROA (6.2%) and mean Tobin's Q (1.34) are comparable to previous research done in Pakistan. The composite score for the corporate governance quality has a mean of 0.57 (standard deviation 0.22), representing a wide range of corporate governance variation for the sample.

Variable	Mean	SD	Min	Max	Observations
GAP (EDI Score)	0.42	0.18	0.04	0.91	1,620
CSR Index	0.38	0.16	0.02	0.87	1,620
CG Composite	0.57	0.22	0.11	0.95	1,620
ROA (%)	6.21	5.83	-18.4	29.7	1,620
ROE (%)	11.34	9.12	-32.1	54.6	1,620
Tobin's Q	1.34	0.68	0.41	4.82	1,620
Firm Size (ln Assets)	9.47	1.21	6.83	13.14	1,620
Leverage	0.44	0.19	0.02	0.91	1,620
Firm Age (ln years)	3.21	0.54	1.60	4.61	1,620

Table 2. Descriptive Statistics (N = 180 Firms; 1,620 Firm-Year Observations, 2015–2023)

6.2 Correlation Analysis and Multicollinearity Diagnostics

The Pearson correlation matrix of all variables of the study is shown on Table 3. GAP is positively and significantly correlated with CSR ($r = 0.61$, $p < 0.01$), ROA ($r = 0.34$, $p < 0.01$), ROE ($r = 0.29$, $p < 0.01$), and Tobin's Q ($r = 0.41$, $p < 0.01$). The correlation between the GAP and CG is 0.48 with a significance of < 0.01 , indicating that the quality of environmental disclosure positively correlates with better CG. No correlation between inter variables is greater than 0.75 which means there is no severe multicollinearity. VIF values range from 1.12 to 2.87 for all the predictors which are below the conventional VIF value of 10 (Hair et al., 2019); hence multicollinearity is not a problem in the regressions.

6.3 System GMM Results: Direct Effects

Results from the direct effect of GAP on CFP are presented in Table 4 using System GMM. GAP has statistically significant and positive impact on finance performance at all three dependent variables. To be specific, with other variables such as firm size, leverage, and age, year and firms fixed effects controlled for, a 1 unit increase in the EDI is associated with a 3.14 percentage point increase in ROA ($\beta = 3.14$, $p < 0.01$), a 5.67 percentage point increase in ROE ($\beta = 5.67$, $p < 0.01$), and a 0.38 increase in Tobin's Q ($\beta = 0.38$, $p < 0.01$). These findings offer solid evidence in favor of H1. The significant lagged dependent variables testify that the financial performance process is indeed dynamic in all specifications, and suggest that the System GMM approach is valid. In all models, there is no evidence of instrument proliferation or model misspecification since the Arellano–Bond AR(2) statistic is not significant ($p > 0.10$) and the Hansen–Sargan J-statistic confirms the instruments' validity ($p > 0.20$).

6.4 Mediation Analysis: The Role of CSR

Mediation analysis is reported in Table 5 based upon the Baron and Kenny (1986) sequential regression approach, and additional Sobel–Aroian bootstrapped tests. Path a (GAP $\rightarrow$ CSR): $\beta = 0.44$, SE = 0.06, $p < 0.001$. Path b (CSR $\rightarrow$ CFP controlling for GAP): $\beta = 0.29$, SE = 0.08, $p < 0.001$ (ROA). The direct effect of GAP on ROA is still positive and significant after adding CSR (beta = 1.87, $p < 0.01$), suggesting that CSR has partially mediated. This indirect effect (Path a $\times$ Path b) = 0.128 with 95% BCCI [0.074, 0.196] which signifies that the zero does not fall between the intervals, and hence mediation is

statistically significant. The findings substantiate H2, H3 and H4. CSR alone accounts for around 29% of the total effect of GAP on ROA, which is indicative of partial mediation. The qualitative nature of the results is the same for ROE and Tobin's Q. The Modulation Analysis under corporate governance is a case of the fully developed Discovery Methodology.

6.5 Moderation Analysis: Corporate Governance

Table 6 shows the findings of Study on the CORPORATE GOVERNANCE Moderation effect on GAP - CSR relation effect. The results showed that the effect of interaction between gap and CG is positive and significant ($\beta = 0.31$, $SE = 0.09$, $t = 3.40$ and $p < 0.001$), thus result contributes to validation of H5. Simple slopes analysis reveals that, the GAP–CSR relationship becomes significantly positive at high levels of governance quality ($\beta = 0.68$, $p < 0.001$), as the expression of governance quality starts to be weaker but positive ($\beta = 0.44$, $p < 0.001$), and starts to be positive but marginally and insignificant ($\beta = 0.19$, $p > 0.10$) at low levels of governance quality. This finding highlights that governance quality circumstances the effectiveness of environmental disclosure to stir CSR engagement – firms with poor governance would not seem to be able to translate green accounting into actions that translate into stakeholder valued CSR.

6.6 Moderated Mediation: PROCESS Model 14 Results

The results recorded for PROCESS Model 14: Moderated Mediation are presented in the table below. Table 7 describes the conditional indirect effects of GAP on ROA at three levels of corporate governance (via CSR). At high CG (mean + 1 SD): Indirect effect = 0.197, 95% BCCI [0.118, 0.291]; At mean CG: Indirect effect = 0.128, 95% BCCI [0.074, 0.196]; At low CG (mean – 1 SD): Indirect effect = 0.059, 95% BCCI [–0.011, 0.141]. The result shows that the index of moderated mediation = 0.069, 95% BCCI [0.028, 0.122] indicating that the indirect effect is significantly moderated by the level of governance quality. These results are fully supportive of H6 and the mediated pathway between GAP and CFP through CSR is significantly stronger when corporate governance quality is high, establishing the complete moderated mediation mechanism.

6.7 Sectoral Heterogeneity and Robustness Checks

Sectoral heterogeneity analysis (H8) shows the impact of the Gap on CFP is highest in energy-intensive sectors of the economy; the largest coefficient is for the chemicals and materials sector ($\beta = 4.21$, $p < 0.001$), the second is the energy sector ($\beta = 3.87$, $p < 0.01$) and the third is the industrial manufacturing sector ($\beta = 3.14$, $p < 0.01$). The effect is also smaller, but marginally significant, in the consumer goods and services sector ($\beta = 1.23$, $p < 0.05$), which also fits the idea of exposure to the environment depending on the sector. Robustness checks are conducted by (i) replacing ROA with ROE and Tobin's Q (results do not differ from those of the main analysis), (ii) using Fixed Effects as opposed to System GMM (results are estimated to be smaller, but directionally consistent), (iii) omitting the COVID-19 period (2020–2021) (results robust), and (iv) replacing the EDI with a sub-index of mandatory disclosures only (results robust). These exercises screen for the consistency of core findings as a whole.

7. Discussion

The results of the present research have important theoretical and applied implications. On the theoretical side, the support for the sequential relationship between GAP and CSR and CSR and CFP provides a theoretical support of the sequential logic of green accounting as an institutional signal to spread CSR activities and then CFP. This takes stakeholder theory one step further and points to how environmental transparency can translate into stakeholder trust that in turn can be translated to financial value; a relationship that is commonly postulated but rarely explored empirically from Pakistani stakeholder perspective. The governance moderation finding is of significant theoretical importance. The findings that firms with weaker governance structures attain little CSR benefit from green accounting indicates that disclosure is not enough without a set of institutional structures for accountability. Aligns with institutional theory, in that isomorphic pressures encourage disclosure adoption; however, only a firm with good internal governance can use disclosure to create value for its stakeholders. This nuance can have significant consequences for the design of regulations, as only requiring disclosure, without also improving the governance systems, can lead to symbolic compliance without real sustainability effects.

This partial mediation result indicates that green accounting can have a direct impact on the financial effect (CFP) even if the impact through the CSR reputation effect is not included. These channels can be direct environmental efficiency cost-savings (energy, water, waste, etc.), credit market reductions in risk premium for exposure to environmental risks, or signaling to foreign institutional investors with portfolio screens that value environmental, social, and governance (ESG) disclosure quality. These simultaneous pathways are to be disentangled in future studies. The findings of the sectoral heterogeneity are aligned with the literature on the environmental materiality of sectors. For energy-intensive industries, environmental accounting is also more relevant to finances because of increased physical climate risks, regulatory exposure and scrutiny from stakeholders. This discovery indicates that a sector-specific disclosure policy, focusing disclosure requirements on sectors where environmental information is most financially material, is likely to be a more efficient policy than a uniform national policy

8. Theoretical Contributions

There are four theoretical contributions of this study to the sustainability accounting, corporate governance and emerging markets finance literature:

- Mildly shifts green accounting from a passive compliance tool (as suggested by the Natural-RBV, Hart 1995) to one with a strategic institutional dimension: that disclosure quality is an environmental capability which can lead to competitive advantages within capital markets.
- Formalizes a moderated mediation model of the relationships between GAP, CSR, CG and CFP, and tests the four variable causal model, offering a first integrated test of such a causal framework in an emerging economy. Everyone has read Institutional Theory of Change and applied it to the green accounting – performance nexus, showing that coercive, normative, and mimetic isomorphic pressures have different influences on the pathway of green accounting – corporate social responsibility – corporate financial performance in different governance context.
- Provides evidence from Pakistan for the dynamic relationship between financial performance and environmental performance (green accounting), which is the first

evidence relationship based on System GMM within Pakistan and directly responds to the endogeneity critical in sustainability–performance studies using OLS.

- Helps develop sector-specific environmental materiality literature, and clearly identifies that GAP effects are largest for industries with a high energy content in their material impacts, which forms the basis for risk differentiated regulating approaches.

9. Practical and Policy Implications

9.1 For Corporate Managers

Sometimes, it would be better for companies to see green accounting as an investment in strategic business capabilities, rather than merely a report. The study reveals that companies with EDI scores exceeding 0.60 realize higher financial returns than those with scores below 0.30, suggesting that it may be worth a lot to easily improve environmental disclosure systems. If CSR expenditure is in line with credible environmental accounting frameworks, this will create reputational and relationship capital, which will ultimately lead to better ROA and Tobin's Q.

9.2 For Regulators and Policy Makers

The SECP and PSX can introduce a gradual (phased) mandatory ESG disclosure mechanism starting from the top five energy-intensive sectors (energy, chemicals, cement, textiles, small and large-scale steel and other energy-intense sectors) and then getting implemented by all listed companies. The disclosure effectiveness is contingent on governance quality means that the disclosure enforcers (SECP) should couple up with the disclosure enforcers as well (governance quality enforcers like board independence, audit committee and anti-concentration ownership clauses) and could be made binding in the SECP Corporate Governance Code.

9.3 For Investors and Analysts

The institutional and foreign portfolio investors being used to consider PSX firms for investment should consider EDI scores and governance composite indices as complementary screening dimensions of the traditional financial ratios. The analysis reveals statistically significant positive risk-adjusted returns associated with higher Gaps

and Governance scores, aligning with the ever-expanding body of evidence on the financial materiality of ESG factors in emerging market companies.

9.4 For Multilateral Organizations

Development finance institutions (IFC, ADB, AIIB) supporting the ongoing growth of Pakistan's economy should prioritize the need for capacity building for listed companies who need to acquire the skills needed for efficient environmental management accounting to generate credible and standardized EDIs disclosures. Offering technical assistance that will both improve disclosure quality and increase governance capacity, will be the most productive combinations in terms of financial-performance multipliers.

10. Limitations and Directions for Future Research

The study was limited by its small size, and further research is suggested. There are a number of limitations to this study, which provide avenues for future research. Secondly, the EDI is created by a binary scoring principle of disclosed items only, which does not represent the depth but the breadth of disclosure, accuracy of data or independent verification. In future research, it is beneficial to investigate the verified environmental information (such as CDP scores, MSCI ESG ratings) as alternative indicators of the quality of green accounting. Second, this study is conducted on a sample of non-financial PSX firms, thereby restricting the generalizability of the findings to financial sector firms which have a different type of sustainability disclosure for their specific regulatory requirements. Third, although most endogeneity issues are addressed by System GMM, omitted variable bias is not ruled out unless there is an experimental or quasi-experimental design, which can be supplied by firm culture and managerial ESG preferences.

Future research directions include:

1. analysis could be extended to the other countries of OIC to observe the green accounting effectiveness across countries of Pakistan, Malaysia, Indonesia, and Turkey;
2. the text analysis of the sustainability reports using machine learning techniques could be used to create continuous and semantically-rich disclosure quality scores that supplement binary indices;

3. a longitudinal study approach is proposed which could study the capital market reaction to new regulatory shocks requiring firms to report their environmental, social and governance practices for the first time only;
4. the study could investigate whether the green accounting of firms is mediated by shariah-compliant financing instruments such as green Sukuk and ESG waqf funds in the dual market.

11. Conclusion

This study contributes the rigorous empirical evidence based on General Method of Moments (GMM) to show that green accounting practices have a significant and positive effect on financial performance of non-financial firms listed on the PSX both direct and indirect (mediated) mechanism of CSR engagement. The moderated mediation analysis finds that these corporate governance qualities are important boundary conditions: CDS "moderated" by corporate governance quality shows that firms with poorer governance qualities do not translate disclosure into effective CSR activity valued by stakeholders but firms with better governance qualities reap far more value from their funding of environmental disclosures.

The high financially exposure sensitivity to GAP adoption is confirmed by sector-level analysis, which shows that energy-intensive industries are the ones that can gain the most from gap adoption. As a whole, the discoveries point to a new understanding of green accounting as a signal, not only of compliance, but also strategic and generative for the institutional entity, and with tangible positive impact on the value of the firm. More robust institutional systems for credible environmental accounting are not just a regulatory need but a clear value-enhancing long-term investment in Pakistan's corporate competitiveness, as the country moves towards its bold climate adaptation commitments, yet now needs to tap into sustainability-related international investment funds. This is the work of a preliminary study that lends some empirical basis to that argument, and that calls for a new generation of research to be supported by this work.

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