Examining the Moderating Role of Tax Avoidance in the Relationship Between Corporate Social Responsibility and Operating Cash Flow Opacity in Companies Listed on the Tehran Stock Exchange



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Abstract: This study examines the moderating role of tax avoidance in the relationship between corporate social responsibility and operating cash flow opacity in companies listed on the Tehran Stock Exchange. The study is applied in purpose and descriptive–correlational in method; its geographical scope encompasses companies listed on the Tehran Stock Exchange. The statistical sample comprises 130 companies over the period from March 2016 to March 2024. The required information was collected from financial statements published on the website of the Tehran securities market regulator. The statistical tests were conducted using EViews software. Information was collected through both library research and fieldwork. Multiple regression was used to test the research hypotheses. The results indicated a positive and significant relationship between corporate social responsibility and operating cash flow opacity. Corporate tax avoidance moderates the relationship between corporate social responsibility and operating cash flow opacity.

Keywords: tax avoidance, corporate social responsibility, operating cash flow opacity

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1. Introduction

Corporate transparency is fundamental to the effective functioning of capital markets because investors, creditors, and other stakeholders depend on reliable information to evaluate corporate performance and managerial accountability. Operating cash flow occupies a particularly important position in this information environment, providing insights into a company's capacity to generate funds from its principal activities and sustain its operations. Nevertheless, the apparent concreteness of cash transactions does not necessarily eliminate managerial discretion over their timing, classification, and presentation. Operating cash flow opacity therefore raises concerns about whether reported cash flows faithfully communicate underlying economic performance. Research examining operating cash flow opacity and stock price crash risk places this reporting characteristic within the broader discussion of information concealment and capital market consequences [1]. Related research on cash flow management, accruals management, and credit ratings further emphasizes the need to distinguish different dimensions of financial reporting quality [2].

Within this setting, corporate social responsibility (CSR) has become an important consideration in evaluating whether organizational conduct extends beyond short-term financial objectives. CSR encompasses corporate

responsibilities toward employees, communities, the environment, and other stakeholders, while environmental, social, and governance indicators provide an operational framework for assessing associated practices and disclosures. However, socially responsible activities and transparent financial reporting represent distinct dimensions of accountability, and consistency between them cannot be assumed. Research examining CSR, corporate opacity, and financial performance illustrates the importance of considering these dimensions together [3]. Similarly, investigations of CSR and financial reporting quality provide a foundation for assessing whether responsible corporate conduct is reflected in the credibility of accounting information [4]. The central question is consequently whether CSR accompanies substantive transparency or can coexist with reporting practices that obscure operating performance.

From a stakeholder perspective, socially responsible companies have incentives to provide reliable information because their relationships with resource providers depend on trust and sustained cooperation. Transparent reporting can help stakeholders assess whether corporate commitments are supported by actual economic conduct. CSR may therefore be associated with lower information asymmetry when it forms part of a broader organizational commitment to accountability. This reasoning is relevant to research examining the relationship between CSR and information asymmetry [5], as well as work investigating CSR disclosure and financial transparency in India [6]. Nevertheless, the existence of CSR disclosures alone does not establish their informativeness. Their usefulness depends on whether they provide verifiable information and complement financial reporting, rather than merely increasing the volume of corporate communication.

An alternative explanation emerges from agency theory, which recognizes that managers may pursue personal objectives when stakeholders cannot fully observe their decisions. Under this perspective, CSR activities may provide reputational benefits that coexist with opportunistic financial reporting. Managers could emphasize visible social initiatives while less observable reporting choices remain difficult to evaluate. The relevance of this possibility is reflected in research jointly examining earnings management, CSR, and governance structures in Egypt [7], and CSR, earnings management, and tax avoidance in China [8]. Research considering earnings management as a moderator of the CSR–performance relationship also demonstrates the importance of examining reporting behavior alongside responsibility initiatives [9]. These competing perspectives make the direction of the CSR–opacity relationship an empirical question rather than an automatic consequence of responsible corporate engagement.

Signaling theory adds another explanation by considering whether observable CSR activities convey credible information about otherwise unobservable corporate characteristics. A socially responsible initiative may influence stakeholder assessments, but its signaling value depends on the surrounding information environment. A theoretical analysis of firm opacity and CSR indicates that CSR can credibly signal firm value under intermediate levels of opacity, rather than having an equally informative role across all transparency conditions [10]. This conditional relationship cautions against treating CSR as a universal substitute for reliable financial information. Forward-looking disclosures and integrated reporting provide a related context for examining how companies communicate financial and nonfinancial prospects [11]. Together, these perspectives suggest that the interpretation of CSR requires attention to disclosure quality and the credibility of accompanying accounting information.

Corporate governance may influence whether CSR supports transparency or primarily serves managerial interests. Boards can shape the allocation of resources to social initiatives, scrutinize reporting decisions, and evaluate whether corporate communications accurately represent organizational performance. Research linking CSR, boards of directors, and firm performance provides a basis for considering these oversight functions [12].

Work examining boardroom attributes in the relationship between CSR disclosure and information asymmetry similarly highlights the relevance of governance arrangements [13]. Managerial incentives are also pertinent, as reflected in research on chief executive officers' relative compensation and CSR [14]. Furthermore, studies of CSR and earnings quality in family firms indicate that ownership context deserves consideration when interpreting the informational implications of responsible business practices [15].

CSR also operates through internal organizational practices, including the treatment of employees, the distribution of responsibilities, and the mechanisms through which management explains and justifies its decisions. Research examining telework through internal CSR, governmentality, and accountability during the COVID-19 pandemic broadens the concept beyond external philanthropy and sustainability statements [16]. This perspective matters because financial transparency ultimately depends on internal decisions concerning recordkeeping, reporting incentives, and oversight. A company's external responsibility profile may therefore be insufficient to establish the quality of its internal accountability arrangements. Examining operating cash flow opacity provides a focused way to investigate whether outwardly responsible conduct is accompanied by financial information that enables stakeholders to evaluate operational performance.

Tax avoidance introduces an additional dimension to this relationship. It concerns arrangements intended to reduce tax liabilities and should be distinguished from illegal tax evasion. Although reducing tax payments can preserve corporate resources, the implications for accountability depend on the nature and complexity of the arrangements involved. Tax planning may create information demands that outside stakeholders find difficult to satisfy, especially when the relationship between accounting income, taxable income, and cash taxes is unclear. Research on tax aggressiveness and corporate transparency directly addresses this informational concern [17]. Related work examines tax avoidance and earnings opacity [18], while a theoretical treatment of tax avoidance and corporate opacity provides a framework for considering their conceptual connections [19].

The relationship between CSR and tax avoidance is itself theoretically ambiguous. Tax payments support public services and can therefore be considered part of a company's contribution to society. Conversely, managers may regard tax savings as resources available for investment, employment, or other stakeholder-oriented activities. A theoretical analysis shows that different elements of CSR can interact with tax avoidance in ways that prevent a simple interpretation of an aggregate CSR measure [20]. Empirical research on French companies also places CSR and tax avoidance within a common analytical framework [21]. Research employing a quantile approach to CSR and corporate tax payments further directs attention to variation across firms rather than assuming that the relationship is uniform throughout the corporate population [22].

Institutional conditions and ownership arrangements may further shape corporate tax behavior. The relationship between CSR and tax incentives in Tunisian companies illustrates the relevance of the fiscal environment [23]. Research examining stronger tax enforcement through differences in CSR profiles likewise suggests that enforcement conditions belong in the analysis of tax avoidance [24]. Family ownership provides another potentially relevant context, as considered in work on its channeling role in the CSR–tax avoidance relationship [25]. Moreover, investigations of tax avoidance and the cost of debt incorporate ownership structure and corporate governance, connecting tax decisions with financing relationships [26]. These different research settings support a contextual approach to tax avoidance rather than treating it as an isolated indicator of managerial conduct.

Tax avoidance may consequently moderate the relationship between CSR and operating cash flow opacity. Under an accountability-based explanation, socially responsible firms may maintain reporting discipline even when engaging in tax planning, limiting the extent to which tax-related complexity obscures operating

performance. Under an opportunistic explanation, managers may combine a favorable responsibility profile with less transparent financial practices, using reputational credibility to reduce scrutiny. Tax avoidance could then strengthen a positive association between CSR and cash flow opacity. Importantly, the direct relationship and the interaction are different questions: an association between CSR and opacity does not establish that it changes with tax avoidance. Research explicitly examining these three constructs in Egyptian listed companies provides a direct precedent for investigating this moderation mechanism [27].

A focused examination of operating cash flow is particularly useful because cash generation, financing decisions, and tax payments are economically connected. Differences in profitability and leverage may influence both incentives for tax planning and the financial conditions underlying reported cash flows. Research examining profitability, leverage, and operating cash flow in relation to tax avoidance addresses these overlapping characteristics [28]. Related work considers operating cash flows, foreign ownership, and solvency as explanatory factors in tax avoidance [29]. These connections justify accounting for relevant financial characteristics when evaluating the CSR–opacity relationship. They also underscore the need for careful measurement: an abnormal operating cash flow estimate is an empirical proxy for potential reporting discretion and should not automatically be interpreted as definitive evidence of intentional manipulation.

The Iranian capital market provides a relevant setting for extending this analysis. Domestic research has examined managerial moral hazard and operating cash flow opacity with attention to information environment quality [30]. Other work considers investment levels and market power in relation to cash flow opacity [31], while research on investment efficiency incorporates agency costs into the analysis of operating cash flow opacity [32]. The supplied domestic literature also includes an investigation of cash flow opacity and stock price crash risk [33]. These research directions position cash flow transparency as a concern extending beyond accounting presentation to managerial incentives, investment decisions, and the information used in capital market valuation.

Domestic studies also provide links between the specific constructs examined here. Research on operating cash flow opacity and tax avoidance in the Iranian capital market explicitly incorporates agency costs [34]. Another study considers CSR, institutional environments, and tax avoidance among companies listed on the Tehran Stock Exchange [35]. However, examining these relationships separately does not resolve whether tax avoidance changes the association between CSR and operating cash flow opacity. The research opportunity is therefore to bring these strands together in a single empirical framework. This approach also avoids claiming that the three-variable relationship is entirely unexplored internationally; its contribution lies in assessing its applicability within the Tehran Stock Exchange and the characteristics of the selected corporate sample.

The present study addresses this question using data from 130 companies listed on the Tehran Stock Exchange over the period from March 2016 to March 2024. By examining CSR alongside tax avoidance and their interaction, while controlling for financial leverage, firm size, and return on equity, the analysis distinguishes the direct association from its conditional variation. This distinction is relevant to investors evaluating whether responsibility indicators provide reassurance about reporting quality, boards overseeing the consistency of financial and nonfinancial conduct, and researchers investigating competing explanations of CSR. The study aims to examine the relationship between corporate social responsibility and operating cash flow opacity and determine whether tax avoidance moderates this relationship among companies listed on the Tehran Stock Exchange.

2. Methods and Materials

In terms of research method, this study is classified as descriptive research. Descriptive studies describe and interpret existing conditions and relationships. In terms of purpose, this study is classified as applied research. This type of research seeks to discover new knowledge with a specific practical application to a product or process. More precisely, applied research is an attempt to address a practical problem or difficulty in the real world. In applied research, theories or principles developed through basic research are used to solve practical, real-world problems. This study adopts an ex post facto research design. The ex post facto method is used when the researcher examines a subject after the relevant events have occurred. The statistical population consists of companies listed on the Tehran Stock Exchange. This population was selected because of the ready availability of these companies' financial information and their homogeneity resulting from the regulations and standards of the Tehran securities market regulator. These standards and regulations ensure the uniformity and consistency of corporate financial information and enable researchers to perform more precise analyses. Furthermore, selecting this population may enhance the validity and generalizability of the findings to companies operating in the Iranian capital market. To conduct the required tests and in view of the available information, the study covers the period from March 2016 to March 2024. The sample was selected using systematic elimination. Accordingly, companies meeting the following criteria were included in the sample, while those that did not meet these criteria were excluded.

The company must not have changed its fiscal year or business activity during the study period.

The companies' fiscal year-end must fall on March 19 or March 20, depending on the corresponding Gregorian year.

The company must have been listed on the stock exchange before March 20, 2016, and must have remained active on the exchange through March 19, 2024. Some companies entered or exited the stock exchange during the period under consideration, and their data are unsuitable for comparison with those of other companies. Therefore, companies that were not active on the exchange throughout the entire study period were excluded at this stage.

The data required for the study must be available.

The company must not be a financial intermediary, including a bank, insurance company, investment company, or leasing company. For example, banks and insurance companies have high debt ratios, but these ratios do not indicate financial risk and instead reflect customer deposits. Moreover, investment companies' earnings are the earnings of their investee companies, which are often included in the selected sample, or part of the operating cash flows of financial investment companies may correspond to part of the financing cash flows of manufacturing companies. Thus, using data from these companies alongside those of other companies would lead to incorrect analyses and distort the results of the regression model.

The company's shares must have been traded continuously on the Tehran Stock Exchange, with no trading suspension exceeding three months. Considering the above conditions and restrictions, a total of 130 companies listed on the Tehran Stock Exchange were selected as the research sample.

- **Regression Models**

$$OCFOP_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 LEV_{it} + \beta_3 SIZE_{it} + \beta_4 ROE_{it} + \varepsilon_{it}$$

$$OCFOP_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 CETR_{it} + \beta_3 CSR \times CETR + \beta_4 LEV_{it} + \beta_5 SIZE_{it} + \beta_6 ROE_{it} + \varepsilon_{it}$$

- **Research Variables**
- **Dependent Variable**

Operating cash flow opacity: Following the assumptions of Dechow et al. (1998), the following model is used to estimate abnormal operating cash flows as a measure of operating cash flow management, as implemented by Cheng et al. (2020), using firm-level annual time-series data for the preceding ten years:

$$\frac{OCFOP_t}{TA_{t-1}} = \lambda_0 + \lambda_1\left(1/TA_{t-1}\right) + \lambda_2\left(SALE_t / TA_{t-1}\right) + \lambda_3\left(\Delta SALE_t / TA_{t-1}\right) + \varepsilon_t$$

where OCFOP denotes operating cash flow for period t;

TA denotes total assets at the end of period t − 1;

SALE and ΔSALE denote total reported sales and the change in total reported sales during period t, respectively. The parameter estimates are therefore used to estimate deviations from normal OCFOP. The residual from the estimation model represents the difference between observed OCFOP and its expected normal level. Accordingly, higher OCFOP values indicate that companies are more likely to manage reported operating cash flow and thus exhibit higher levels of operating cash flow opacity.

- **Independent Variables**

Corporate social responsibility: The ESG index is used. In this study, ESG is measured using the Bloomberg model as discussed by Siahoni and Handayani (2020) and the study by Fakhari et al. (2017). Given the emerging nature of these issues in Iran, Fakhari et al. (2017) developed a model for ranking companies according to their level of ESG reporting using the analytic hierarchy process in Iran. For this purpose, a questionnaire was developed based on a conceptual model derived from existing frameworks, guidelines, and rating systems in corporate social responsibility, sustainability reporting, and environmental, social, and governance reporting. The questionnaire was submitted to experts for their opinions, and AHP analyses ultimately yielded checklists of ESG reporting criteria and indicators. By substituting the relevant values into the formula ESG = 0.337E + 0.388S + 0.275G, companies can be ranked according to the ESG index. Based on this ranking, companies can be classified as having weak or strong credibility.

- **Moderating Variable**

Tax avoidance: The cash effective tax rate is used to measure tax avoidance and is calculated by dividing cash taxes paid by pretax income. A higher value of this index indicates a lower level of tax avoidance. Accordingly, the calculated effective tax rates are multiplied by −1.

- **Control Variables**

SIZE: Firm size: The natural logarithm of assets.

ROE: Return on equity: Profit.

3. Findings and Results

According to the results presented in Table 1, the mean operating cash flow opacity index is 0.123, indicating that, on average, the companies examined engage in a level of operating cash flow management that may be interpreted as evidence of reduced transparency in operating cash flow reporting. The median value of this index is 0.110, indicating that half of the companies have opacity values below this level and the other half have values above it. The maximum and minimum values are 0.251 and 0.054, respectively, indicating a relatively narrow range. The standard deviation of 0.053 also indicates limited dispersion around the mean and relative homogeneity among the observed values. Positive skewness of 0.869 indicates that the distribution extends toward higher values; in other words, a small proportion of companies have very high opacity values. The kurtosis of 2.954 also indicates that the data are relatively concentrated around the mean and that the distribution is more peaked than the normal

distribution. Because this index represents the extent to which actual operating cash flow deviates from its expected value, higher values indicate a greater likelihood of cash flow management and, consequently, lower reporting transparency. Given the small magnitude of the operating cash flow opacity values, they are multiplied by 100 to prevent the coefficients of the other variables from becoming small.

Table 1. Descriptive Statistics of the Research Variables

Variable	Symbol	Mean	Median	Maximum	Minimum	SD	Skewness	Kurtosis
Operating cash flow opacity	OCFOP	0.123	0.110	0.251	0.054	0.053	0.869	2.954
Corporate social responsibility	CSR	4.371	4.191	7.724	1.677	1.677	0.311	2.252
Tax avoidance	CETR	−0.082	−0.085	0.000	−0.199	0.066	−0.166	1.763
Financial leverage	LEV	0.534	0.537	0.868	0.175	0.200	−0.101	2.019
Firm size	SIZE	15.093	14.938	18.029	12.725	1.382	0.345	2.493
Return on equity	ROE	0.313	0.299	0.774	−0.086	0.248	0.222	1.991

An examination of the other research variables shows that mean corporate social responsibility, measured using the ESG index, is 4.371. This value indicates that, on average, the sample companies demonstrate a relatively satisfactory level of compliance with environmental, social, and corporate governance requirements and practices.

Mean tax avoidance is −0.082. Given the definition of this index, which multiplies the effective tax rate by −1, companies show a tendency to reduce their tax burden through avoidance practices by an amount equivalent to 8.2% of their profits. The minimum tax avoidance value is zero, indicating that tax avoidance did not occur in some companies. Furthermore, mean financial leverage is 0.534, indicating that, on average, 53.4% of companies' assets are financed through debt and that their capital structures rely primarily on financial leverage.

Mean firm size, calculated as the natural logarithm of total assets, is 15.093. Finally, mean return on equity is 0.313, indicating that the sample companies generated annual net income averaging 13.3% of shareholders' equity; this reflects substantial profitability and the relative attractiveness of their financial performance compared with many industries and alternative markets.

The F-Limer test is used to determine whether panel data estimation should be selected over pooled data estimation.

According to the statistical results in Table 2, the p values of the F-Limer test for the research models are below the 5% significance level; therefore, the panel data specification is supported. In view of these results and the selection of panel data estimation, the Hausman test is required. The Hausman test results are reported in Table 3.

Table 2. F-Limer Test Results

Model	F statistic	Degrees of freedom	p value	Result
Research Model 1	16.373	−129.906	0.000	Panel data estimation
Research Model 2	15.928	−129.904	0.000	Panel data estimation

Given that the p value of the test statistic is below the 5% significance level, the fixed-effects panel data model is supported because the null hypothesis of random effects is rejected.

Table 3. Hausman Test Results

Model	F statistic	Degrees of freedom	p value	Result
Research Model 1	56.128	6.000	0.000	Fixed effects
Research Model 2	38.227	4.000	0.000	Fixed effects

In this study, the assumption of homoscedasticity of the residuals was examined using White's test. The results in Table 4 indicate that the null hypothesis of homoscedasticity is rejected for the research models; therefore, heteroscedasticity is present in both models. Generalized least squares (GLS) regression is used to address heteroscedasticity.

Table 4. Results of the Test for Homoscedasticity of the Error Term

Model	F statistic	p value	Result
Research Model 1	7.114	0.000	Heteroscedasticity present
Research Model 2	6.776	0.000	Heteroscedasticity present

The Breusch–Godfrey statistic was used to examine the independence of the residuals. The results in Table 5 indicate that this statistic is significant at the 95% confidence level in both models; therefore, autocorrelation is present among the model residuals. Regression with robust standard errors is used to address autocorrelation in the error term.

Table 5. Results of the Test for the Absence of Autocorrelation in the Error Term

Model	F statistic	p value	Result
Research Model 1	802.274	0.000	Autocorrelation present
Research Model 2	717.865	0.000	Autocorrelation present

Multicollinearity refers to a strong relationship among the independent and control variables included in the model. To rule out multicollinearity, the variance inflation factor for the variable in question must be below 10; otherwise, that variable gives rise to multicollinearity. Accordingly, the VIF test results for the research models are presented in Table 6. The results indicate that the variance inflation factors for some variables in the first and second models exceed 10. Thus, multicollinearity is present. Mean-centering was therefore used to resolve the multicollinearity problem. It should be noted that, because the independent and control variables are identical in both models, the multicollinearity results are also similar and are therefore reported only once.

Table 6. Results of the Multicollinearity Test Using VIF

Variable	Symbol	Model 1	Model 2
Corporate social responsibility	CSR	1.138	2.510
Tax avoidance	CETR	.	7.897
Tax avoidance × Corporate social responsibility	CSR*CETR	.	9.550
Financial leverage	LEV	1.042	1.052
Firm size	SIZE	1.188	1.241
Return on equity	ROE	1.100	1.219
Constant	C	—	—

As shown in Table 7, the F statistic is 58.926 and its p value is 0.000. Because this value is below 0.05, the null hypothesis is rejected at the 95% confidence level, indicating that the model is statistically significant overall. The adjusted coefficient of determination indicates that 88% of the variation in operating cash flow opacity can be predicted by the variables specified in the model. Given the overall significance of the models, the significance of individual variables can be assessed.

Regarding the first hypothesis, the coefficient of corporate social responsibility is 0.321. This coefficient is significant at the 95% confidence level because the p value of the t statistic, 0.000, is below the critical level of 0.050 and thus below the 5% significance threshold. Accordingly, an increase in corporate social responsibility is

associated with an increase in operating cash flow opacity. Therefore, the first hypothesis, which posits a relationship between corporate social responsibility and operating cash flow opacity, is supported.

Table 7. Estimation Results for Research Model 1

$OCFOP_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 LEV_{it} + \beta_3 SIZE_{it} + \beta_4 ROE_{it} + \varepsilon_{it}$

Regression coefficients

Variable	Symbol	Coefficient	Standard error	t statistic	p value
Corporate social responsibility	CSR	0.321	0.036	9.000	0.000
Financial leverage	LEV	−0.391	0.320	−1.221	0.223
Firm size	SIZE	1.289	0.118	10.901	0.000
Return on equity	ROE	−2.225	0.275	−8.086	0.000
Constant	C	−9.029	1.950	−4.630	0.000

Model fit

F statistic	p value of F	R^2	Adjusted R^2
58.926	0.000	0.896	0.881

As shown in Table 8, the F statistic is 58.926 and its p value is 0.000. Because this value is below 0.05, the null hypothesis is rejected at the 95% confidence level, indicating that the model is statistically significant overall. The adjusted coefficient of determination indicates that 86% of the variation in operating cash flow opacity can be predicted by the variables specified in the model. Given the overall significance of the models, the significance of individual variables can be assessed.

Regarding the second hypothesis, the coefficient of the interaction between corporate social responsibility and tax avoidance is 1.813. This coefficient is significant at the 95% confidence level because the p value of the t statistic, 0.011, is below the critical level of 0.050 and thus below the 5% significance threshold. Accordingly, in companies pursuing tax avoidance strategies, an increase in corporate social responsibility is associated with a greater increase in operating cash flow opacity. Therefore, the second hypothesis, which posits that corporate tax avoidance moderates the relationship between corporate social responsibility and operating cash flow opacity, is supported.

Table 8. Estimation Results for Research Model 2

$OCFOP_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 LEV_{it} + \beta_3 SIZE_{it} + \beta_4 ROE_{it} + \varepsilon_{it}$

Regression coefficients

Variable	Symbol	Coefficient	Standard error	t statistic	p value
Corporate social responsibility	CSR	0.418	0.069	6.068	0.000
Tax avoidance	CETR	2.343	4.180	0.561	0.575
Tax avoidance × Corporate social responsibility	CSR*CETR	1.813	0.708	2.560	0.011
Financial leverage	LEV	−0.854	0.311	−2.749	0.006
Firm size	SIZE	1.265	0.112	11.256	0.000
Return on equity	ROE	−2.379	0.300	−7.928	0.000
Constant	C	−8.416	2.040	−4.126	0.000

Model fit

F statistic	p value of F	R^2	Adjusted R^2
51.957	0.000	0.886	0.869

4. Discussion and Conclusion

The findings indicate that corporate social responsibility (CSR) is positively associated with operating cash flow opacity among the sampled companies listed on the Tehran Stock Exchange. In the first model, the CSR coefficient was positive and statistically significant ($B = 0.321$, $t = 9.000$, $p < .001$), supporting the first hypothesis. The model was significant overall ($F = 58.926$, $p < .001$), with an adjusted R^2 of .881. In the second model, the interaction between CSR and tax avoidance was also positive and significant ($B = 1.813$, $t = 2.560$, $p = .011$), supporting the proposed moderating relationship. This model was statistically significant ($F = 51.957$, $p < .001$), with an adjusted R^2 of .869. Together, these results suggest that a stronger responsibility profile does not necessarily correspond to more transparent operating cash flow reporting and that the association varies with corporate tax avoidance.

The positive relationship between CSR and operating cash flow opacity is consistent with an agency-based interpretation of corporate responsibility. Managers may pursue visible social and environmental initiatives while retaining discretion over less observable financial reporting decisions. Such initiatives can generate reputational benefits without necessarily strengthening the internal controls governing cash flow reporting. This interpretation closely aligns with the findings of Metwally and colleagues, who reported a significant positive association between CSR and operating cash flow opacity in Egyptian listed companies [27]. The present findings extend this pattern to the sampled Iranian companies. Nevertheless, the association does not establish that managers deliberately use CSR to conceal financial misconduct; reputational protection is a plausible explanation rather than a mechanism directly tested by the regression models.

A related explanation concerns the distinction between reported responsibility and substantive accountability. The ESG-based measure captures environmental, social, and governance reporting, but a higher score does not necessarily demonstrate that responsible principles consistently govern financial decisions. Companies may disclose extensive information about selected activities while providing less informative explanations of operating cash flow fluctuations. This possibility is relevant to research examining CSR alongside earnings management and governance structures [7]. It also connects with research treating earnings management as a condition affecting the relationship between CSR and corporate performance [9]. The present results therefore suggest that stakeholders should assess the consistency between nonfinancial disclosures and financial reporting practices rather than infer overall transparency from an aggregate responsibility score.

However, the positive association differs from evidence supporting a transparency-enhancing role for CSR. Research on United States companies found that higher CSR scores were associated with more accurate financial forecasts, fewer earnings surprises, and greater analyst coverage [4]. Research in India likewise found that CSR disclosure improved financial transparency under a mandatory disclosure regime [6]. These differences indicate that CSR does not have a uniform relationship with every reporting outcome. Analyst forecasts, general financial transparency, and abnormal operating cash flows capture different informational dimensions. Differences in disclosure requirements, stakeholder scrutiny, ownership structures, and measurement may also explain why responsibility indicators accompany greater transparency in some settings but greater cash flow opacity in the present sample.

Institutional conditions offer another explanation for these contrasting findings. Research on Chinese listed companies found that government-guided CSR constrained earnings management and tax avoidance, although the effect was limited to state-owned enterprises [8]. This conditional result suggests that responsibility initiatives may depend on supporting ownership and oversight arrangements to influence reporting behavior. The present study

does not directly test these institutional mechanisms, but its findings are compatible with the broader argument that CSR indicators should be interpreted within their governance context. Research addressing board attributes, CSR disclosure, and information asymmetry provides a relevant framework for this interpretation [13]. Similarly, the consideration of institutional environments in Iranian research on CSR and tax avoidance reinforces the relevance of context to these relationships [35].

The second principal finding concerns the positive interaction between CSR and tax avoidance. Because the study measures avoidance using the cash effective tax rate multiplied by −1, higher values indicate lower cash tax rates and, subject to the limitations of this proxy, greater tax avoidance. The positive interaction coefficient therefore indicates that the CSR–opacity slope becomes more positive as avoidance increases. This is an association between variables, rather than evidence that tax avoidance causally changes managerial behavior. Furthermore, because the methods report mean-centering, the CSR coefficient in the interaction model should be interpreted at the reference value of the centered moderator. A complete assessment of the conditional relationship would require marginal effects and confidence intervals across observed avoidance levels, beyond the significance of the interaction coefficient alone.

One explanation for this interaction is that tax planning can increase the complexity of financial information and make the economic substance of transactions more difficult for outside stakeholders to assess. When a company also maintains a favorable responsibility profile, stakeholders may place greater confidence in its disclosures without equally scrutinizing the relationship between reported income, cash taxes, and operating cash flows. This explanation is consistent with evidence associating aggressive tax planning with lower corporate transparency [17]. It also corresponds conceptually with research examining tax avoidance and corporate opacity [19]. The present interaction result adds a conditional dimension: the informational implications of CSR appear to depend partly on the company's tax behavior, rather than being captured adequately by the CSR coefficient alone.

Importantly, the standalone tax avoidance coefficient in the second model was not statistically significant (B = 2.343, p = .575). This does not invalidate the significant interaction because the two coefficients address different questions. The standalone coefficient describes the avoidance–opacity association at the reference CSR value, whereas the interaction indicates how that association changes with CSR. The results therefore support moderation without establishing a uniform positive relationship between tax avoidance and opacity across all companies. This distinction fits the theoretical argument that different dimensions of responsibility can interact with tax behavior in competing ways [20]. Research examining CSR and tax avoidance in family firms further supports considering ownership-related differences rather than assuming a single relationship across organizational settings [25].

The control variables provide additional context. Firm size was positively associated with opacity in both models, while return on equity was negatively associated with opacity. Larger firms may face greater transactional complexity, whereas more profitable firms may experience less pressure to present an unusually favorable picture of operating cash generation; these remain possible explanations rather than established mechanisms. Financial leverage was insignificant in the first model but negative and significant in the second, indicating sensitivity to model specification. Research considering profitability, leverage, and operating cash flow in relation to tax avoidance highlights the relevance of evaluating these financial characteristics jointly [28]. Although both models had high adjusted R^2 values, this fit concerns the complete specifications, including fixed effects, and should not be attributed solely to CSR or interpreted as evidence of causal explanatory power.

Overall, the study contributes by distinguishing responsibility reporting from operating cash flow transparency and identifying tax avoidance as a condition associated with their relationship. Its contribution is also relevant to

Iranian research examining cash flow opacity through managerial moral hazard, information environment quality, and agency costs [30, 34]. The findings support evaluating financial and nonfinancial accountability together. They do not imply that CSR is inherently opportunistic or that every deviation from expected operating cash flow represents manipulation. Rather, the evidence indicates that responsibility scores alone provide an incomplete basis for assessing reporting credibility in the sampled firms.

Several limitations should be acknowledged. The sample comprises 130 listed companies selected through systematic elimination, limiting generalizability to unlisted firms, financial institutions, and companies with different reporting characteristics. The observational design cannot exclude reverse causality or omitted variables. ESG reporting may imperfectly represent substantive responsibility, abnormal operating cash flows may reflect legitimate business conditions, and cash effective tax rates may be influenced by incentives, losses, and payment timing. The supplied results also contain inconsistencies between some narrative statements and tables, including the reported F statistic for the second model and the discussion of multicollinearity. The covariance estimator used to address serial correlation requires clearer documentation, and marginal-effect estimates are unavailable.

Future research should distinguish environmental, social, and governance dimensions and separate disclosure intensity from independently verified performance. Alternative tax avoidance measures and cash flow opacity specifications would help assess measurement sensitivity. Researchers should report conditional effects with confidence intervals and investigate potential nonlinear relationships. Board independence, audit quality, ownership concentration, managerial incentives, and tax enforcement could be examined as additional conditioning factors. Designs exploiting regulatory changes or other plausibly external variation would strengthen causal interpretation. Interviews with preparers, auditors, and financial analysts could also clarify how responsibility reporting, tax planning, and cash flow presentation interact within organizations.

In practice, investors and analysts should assess CSR disclosures alongside cash flow reconciliations, tax information, profitability, and governance arrangements. Boards and audit committees should review whether responsibility commitments are reflected in financial reporting controls and explanations of unusual cash flow movements. Companies should provide clear accounts of material differences between accounting income, taxable income, and cash taxes paid. Regulators could promote comparable ESG disclosures and stronger links between sustainability reporting and financial accountability. These measures should support substantive responsibility and transparent reporting while avoiding the assumption that a high CSR score, a low cash tax rate, or an abnormal cash flow estimate independently establishes reporting misconduct.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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