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From Corporate Social Responsibility to Stock Price Crash Risk: Modelling the Mediating Role of Firm Performance in an Emerging Market

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Abstract: The literature on the link between corporate social responsibility (CSR) disclosure and stock price crash risk suggests that it is far more complicated than a plain one-to-one relationship. In this study, we examine how CSR disclosure affects the stock price crash risk and whether firm performance acts as a mediating variable in this relationship. The CSR disclosure index is built using the content analysis technique and the GRI criteria. We choose 225 businesses in Vietnam, comprising 159 firms listed on HOSE and 66 firms listed on HNX. Using the techniques of OLS, LOGIT, GMM, and the Sobel test and replacing different measures of dependent and mediator variable to enhance the robustness of our findings, we reach two important results. To begin with, CSR disclosure has a negative influence on the stock price crash risk of Vietnam's listed firms. Second, in the aforementioned relationship, firm performance serves as an intermediate. Our results imply that listed firms should engage in CSR practices and disclosure in order to raise the firm's performance and lower the stock price crash risk.

Keywords: corporate social responsibility; firm performance; stock price crash risk; mediation roles



Citation: Thuy, C.T.M.; Trung, T.Q.; Khuong, N.V.; Liem, N.T. From Corporate Social Responsibility to Stock Price Crash Risk: Modelling the Mediating Role of Firm Performance in an Emerging Market. *Sustainability* **2021**, *13*, 12557. <https://doi.org/10.3390/su132212557>

Academic Editor: Andrea Pérez

Received: 26 September 2021

Accepted: 8 November 2021

Published: 13 November 2021

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1. Introduction

Corporate social responsibility has been a topical issue for academics, regulatory bodies and businesses in recent years. The goal of this study is to investigate whether CSR disclosure may provide advantages to firms or whether it is only a tool for business managers to engage in self-seeking conduct. If the goal of CSR disclosure is to benefit a firm's shareholders and stakeholders, the firm should be encouraged to engage in CSR and publish information about its efforts. Managers who utilize CSR disclosure for self-interest may, on the other hand, exacerbate asymmetric information by withholding bad news while promptly disclosing positive news [1]. When bad news accumulates to a certain level, it is likely to be broadcast to outside investors altogether, leading to a sharp and abnormally significant price drop known as a stock price crash [2–5].

The influence of CSR disclosure on stock price crash risk is now receiving a great deal of attention. Some studies support the negative effect and argue that when firms actively engage in CSR activities, this will result in a decrease in crash risk [6,7]. There is also the view that socially responsible firms commit to higher standards of transparency and hoard less bad news, thereby reducing the stock price crash risk [6–8]. Furthermore, it is found that the negative impact of CSR disclosure on stock price crash risk is mitigated by the enterprise's social capital component [9] or is both moderated and indirectly impacted by the enterprise's internal controls, which serves as a mediator variable [10].

Other studies, on the other hand, suggest that the influence of CSR disclosure on stock price crash risk is unclear. Because a stock price decrease may have a misleading association

due to the time difference between an adverse incidence and its public announcement, CSR policies are thought to have little effect on decreasing the stock price crash risk in Japan [11]. In other words, stock price crash risk is determined only by the significance of the event, not by the time of its revelation. Furthermore, the impact of CSR disclosure on stock price crash risk varies significantly depending on the motivation for disclosure [12] or the region [13]. For Indonesian firms, CSR disclosure is still confined to reports, and it is not seen as a resource that may bring value to the firm or deter management from engaging in unethical activity [14].

Notably, the impact of CSR disclosure on stock price crash risk is not simple, but rather complicated, due to regulatory effects [7–9,15,16], indirect effects [10], nonlinear effects [12], unclear effects [11], or causality-related issues [17]. Previous studies suggest that the effect of CSR disclosure on crash risk could be mediated by firm performance. First, CSR disclosure can enhance firm performance through balancing the competitive interests of all stakeholders and increasing the competitive advantage of the firm [18,19], improving the image and value of the business [20,21], enhancing reputation, differentiating products, attracting highly qualified personnel [22,23], and increasing firm value [24]. Moreover, CSR disclosure enables firms to reduce the impact of bad news [25]. Inadequate negative disclosure might indeed trigger a crash risk [3]. Therefore, CSR disclosure can improve corporate firm performance and thereby reduce crash risk [7,8]. Firms with strong performance are less likely to face crash risk because managers tend to have an incentive to hide only news that reveals weak financial performance [2]. These arguments imply that firm performance is a potential mediator in the relationship between CSR disclosure and crash risk. The goal of this study is to look at the influence of CSR disclosure on stock price crash risk and determine whether firm performance is a mediator variable. If CSR disclosure impacts stock price crash risk, CSR disclosure affects firm performance, and firm performance in turn affects stock price crash risk, it could thus be expected that CSR disclosure might indirectly influence stock price crash risk through firm performance.

This study contributes in both practical and theoretical aspects. Firstly, most of the studies on the effects of CSR on stock price crash risk have been mainly conducted in developed markets (the United States, Japan, and Taiwan), where CSR has long become integrated into firm activities. Recently, the focus has shifted to emerging markets (China, India, Pakistan, Indonesia). In general, studies in developing markets have been struggling with inadequate CSR data, especially in Vietnam, a country with an insufficient framework for CSR activities and transparency. The present study will provide more evidence on the link between CSR and stock price crash risk in Vietnam, thus helping to contrast studies in emerging markets with those in developed markets. Second, institutional differences between countries may have an impact on the relationship among the three factors in the study. This research points to the need to consider cross-cultural and institutional perspectives when investigating the impact of CSR. Moreover, the research offers implications for managers and regulatory bodies in matters related to stock market efficiency and transparency. Third, we use a combination of theories to explain the links between the three factors, which contributes to the application of background theories to examine the role of CSR. Fourth, the study considers the mediating aspect of FP instead of the usual role of the dependent variable often mentioned in previous studies.

Following the Introduction, the rest of the paper is organized as follows: Section 2 provides an overview of the theoretical foundation and empirical investigations, as well as the research hypotheses; Section 3 describes the sample data, research models, and methodologies; Section 4 analyzes the study's findings; and Section 5 concludes and provides policy implications.

2. Analytical Framework and Research Hypothesis

In practice, a stock price crash risk results in a significant reduction in equity value, which results in a marked decrease in shareholders' wealth. Furthermore, stock price crash risk is a substantial concern for corporate executives, as it has an impact on investment

decisions and remuneration for individual executives [4,26]. As a result, scholars are interested in examining the key determinants of stock price declines.

Previous research focused mostly on the financial element of stock price crash risk [1–3,8,12,17,27]. Due to the restricted regulatory framework in developing markets, it is vital to examine the non-financial part of stock price crash risk. The impacts of both financial and non-financial information on stock price crash risk are investigated in this study.

2.1. CSR Disclosure and Stock Price Crash Risk

Extant studies tend to rely on Management Balance Theory and Social Impact Theory to examine the link between CSR disclosure and firm risk [7,8,10,12,17,28].

On the one hand, CSR disclosure is directed toward the interests of the firm's stakeholders, according to Social Impact Theory [29]. Firms with CSR activities will more actively disclose information and improve information transparency [30,31], engage less in tax avoidance [32], and reduce real activities and accruals-based earnings management [33]. Furthermore, CSR disclosure increases transparency because it encourages voluntary disclosure since well-run firms seek to emphasize their excellence by revealing positive financial indicators [34]. On the other hand, the more opaque the information, the greater the chance of a stock price fall [2]. Managers prefer to hide bad news to protect their own interests, and bad news hoarding typically increases the crash risk. To sum up, when corporations actively carry out their social responsibility, they are more likely to publish more information, enhancing transparency and lowering information asymmetry, thus contributing to the reduction of stock price crash risk. Furthermore, more CSR disclosure is likely to be associated with higher ethical standards and codes of conduct [7]. Therefore, it is expected that managers would strive to achieve long-term performance and improve firm reputation to protect stakeholders' interests [35], reduce the tendency to hoard bad news [8], and improve internal and external information exchange in accordance with higher social responsibility standards [36]. As a result, a higher level of CSR disclosure can reduce information asymmetry between shareholders and management, enhance corporate governance, and help to minimize principal–agent conflicts, thereby lowering the stock price crash risk [7].

On the other hand, Balance Theory [37] contends that CSR disclosure facilitates the realization of managers' interests. Firms that issue CSR reports may utilize them to hide bad news and distract shareholders' attention for personal benefit, escalating tensions between corporate management and shareholders and increasing the risk of a stock price crash. In addition, firms with low levels of CSR disclosure are more likely to issue CSR reports in a superficial way to fulfil regulatory, investor, and public expectations, and the content of CSR reports may be identical over time. Philanthropic activities, environmental protection, and other social responsibilities practices are more likely to be utilized to avoid stakeholders' scrutiny and punishment, especially for firms with poor performance or earnings management behavior [38,39] and corruption [40]. Furthermore, CSR reports with opaque information may help to create a favorable image to external stakeholders [41]. Managers might use CSR reporting as a tool to address career concerns, to benefit from compensation contracts, and to increase their reputation in the near term [42], which lowers information transparency. As a result, CSR reporting is more likely to become a managerial tool for self-interest. CSR information could help to mask or delay unfavorable news, which raises agency costs, increases the risks carried by shareholders, and so raises stock price crash risk.

Emerging stock markets, such as the one in Vietnam, are frequently characterized by excessive stock volatility, poor corporate governance, and high levels of information asymmetry. Thus, for a sample of firms in Vietnam, we construct a hypothesis that CSR disclosure enhances corporate governance quality, decreases the conflict between the principal and the agent, and minimizes information asymmetry between managers and shareholders [7].

Hypothesis 1 (H1). *CSR disclosure is inversely related to stock price crash risk.*

2.2. CSR Disclosure and Firm Performance

The impact of CSR disclosure on firm performance could be explained under Agency Theory [43] and Stakeholder Theory [44].

CSR disclosure, according to Agency Theory [43], drives companies to incur more expenses. This is referred to as an agency cost. CSR practices' expenditures are treated as expenses that frequently exceed potential earnings. This indicates that both CSR activities and CSR disclosures consume firm resources without necessarily enhancing firm performance [43,45–47].

With regard to stakeholders' concerns and expectations, according to Stakeholder Theory [44], CSR disclosure may help to avoid actions that could lead stakeholders to interfere with the organization's goals. Furthermore, CSR disclosure reflects what the firm has done in terms of CSR activities. The positive effect of CSR disclosure on financial performance is thought to emerge from firms actively creating the impression of good work by disclosing CSR information that meets or exceeds stakeholder expectations [48]. Several studies have found evidence of a positive effect of CSR disclosure on firm performance, such as improving corporate image and value [20,21], identifying proper investment opportunities [22], balancing the interests of all stakeholders, and increasing the competitive advantage of enterprises [19].

Stakeholder Theory and the mainstream literature suggest that the impact of CSR disclosure on firm performance is favorable [19,49]. In line with this, we set the following hypothesis:

Hypothesis 2 (H2). *CSR disclosure is positively related to firm performance.*

2.3. Firm Performance and Stock Price Crash Risk

Agency Theory [43] and Short-Termism Theory offer possible explanations for the impact of firm performance on stock price crash risk. There are two opposite views based on these two theories.

Managers have an incentive to conceal bad news, according to Agency Theory [43]. They may try to pursue self-interest until it is no longer possible or they choose to stop concealing information. Managers, on the other hand, are not required to hoard positive news. As a result, firms that are less efficient are more prone to face a stock price crash risk [2,50–52].

Short-termism managers have an incentive to engage in earnings manipulations in order to meet their short-term objectives. Whether it is real activities earnings management, accrual-based earnings management, or a mix of the two methods of earnings management, the ultimate goal is to present an image of a successful entity. As a result, if managers are unable to continue to undertake earnings manipulation, firms with strong growth potential may be at risk. In certain cases, even if they are not participating in earnings management on purpose, managers are under pressure from shareholders who are focused on the short-termism. The positive impact of firm performance on stock price crash risk is demonstrated as a result of this as well [9,10,12,17,26,27,53,54].

Many prior studies support the argument of Agency Theory [2,51,52]. Consequently, we suggest the following hypothesis:

Hypothesis 3 (H3). *Firm performance is negatively correlated with stock price crash risk.*

2.4. Mediating Role of Firm Performance

The impact of CSR disclosure on stock price crash risk is not simply positive or negative but also complicated, and some researchers deem it inconclusive [11,13] or not merely a straight linear relationship [8–10,12,15–17].

Given the uncertainty around the impact of CSR disclosure on stock price crash risk, a more sophisticated approach to elucidating the likely transmission mechanism between them appears indispensable. As previously stated, if CSR disclosure decreases (increases) firm performance, firm performance in turn reduces (enhances) stock price crash risk, implying that CSR disclosure indirectly impacts stock price crash risk. The presence of this indirect impact suggests that firm performance has a mediating effect. First, CSR disclosure reduces stock price crash risk (H1); this viewpoint is based on the premise that CSR disclosure improves corporate information transparency, preventing managers from bad news hoarding [8]. At the same time, CSR disclosure enhances firm performance (H2), because this is in line with the interests of shareholders and stakeholders [19]. Next, firm performance reduces stock price crash risk (H3) because managers have an incentive to conceal bad news only [2]. As a result, CSR disclosure not only decreases stock price crash risk directly, but it can also have an indirect effect via mediating factors [10]. The following hypothesis is established:

Hypothesis 4 (H4). *A part of the effect of CSR disclosure on stock price crash risk is mediated by firm performance.*

3. Research Design

3.1. Data Collection

The research sample was drawn from non-financial firms that were listed on Vietnam's stock exchange between 2014 and 2019. The shortlisted firms were required to meet the following two requirements: (1) they had to belong to the non-financial industries, since financial firms have distinct business operations and financial statement reporting requirements; (2) the firms had to represent well their respective sector. Accordingly, we chose each industry's main companies based on the size of their total assets, ensuring that they accounted for 90% or more of the industry's entire total assets. The final sample comprised 1340 firm-year observations. Data on CSR disclosure were gathered from corporate annual reports and sustainable development reports, while Refinitiv Eikon provided the stock price and financial data in the present study.

3.2. Research Models

We present a model based on prior research [7] to assess the influence of CSR disclosure on stock price crash risk (Hypothesis H1).

$$CR_{it} = \delta_0 + \delta_1 CSR_{it} + \delta_2 X_{it} + INDUSTRY_i + \varepsilon_{it} \quad (1)$$

We construct a model based on prior studies [20,21] to assess the influence of CSR disclosure on firm performance (Hypothesis H2).

$$FP_{it} = \delta_0 + \delta_1 CSR_{it} + \delta_2 X_{it} + INDUSTRY_i + \varepsilon_{it} \quad (2)$$

To investigate the influence of firm performance on stock price crash risk (Hypothesis H3), we suggest the following model based on prior research [2,51,52].

$$CR_{it} = \delta_0 + \delta_1 FP_{it} + \delta_2 X_{it} + INDUSTRY_i + \varepsilon_{it} \quad (3)$$

To investigate the indirect impact of CSR disclosure on stock price crash risk through the mediator variable of firm performance (Hypothesis H4), we propose combining the previous three models (1–3) with the following model:

$$CR_{it} = \delta_0 + \delta_1 CSR_{it} + \delta_2 FP_{it} + \delta_3 X_{it} + INDUSTRY_i + \varepsilon_{it} \quad (4)$$

The model can be explained as follows.

The dependent variable, CR, represents the enterprise's stock price crash risk, which is quantified with three proxies, NCSKEW, DUVOL, and CRASH, in line with prior studies [7,51,52,55].

CSR is the explanatory variable, CSR disclosure, which is an index created using content analysis [14,16,45,56–59].

FP is the explanatory variable, representing the firm performance of the enterprise, measured by the ratio between earnings before tax and total assets (ROA) and the ratio between earnings before tax and equity (ROE).

X is a vector of control variables, in line with prior research [2,7,8,26,36,55,60,61]. Control variables for firm size, financial leverage, tangible assets, foreign ownership, revenue growth, listed age, and dividend yield are SIZE, LEV, TANG, FOR, GROW, AGE, and DIV, respectively. SIZE is the logarithm of total assets; LEV is the ratio of total liabilities to total assets; TANG is the ratio of tangible fixed assets to total assets; FOR is the foreign ownership ratio; GROW indicates revenue growth potential; AGE is the logarithm of the company's listing age, and DIV is a financial ratio that compares the annual value of dividends received to the security's market value per share.

INDUSTRY is a vector of dummy variables included in the model to control for the industry effect on stock price crash risk based on prior research [7,10,16]. These are eight non-financial industry dummy variables, comprising Basic Materials, Consumer Cyclicals, Consumer Non-Cyclicals, Energy, Healthcare, Industrials, Technology, and Utilities. Each industry dummy variable is a binary variable with a value of 1 if the firm belongs to one of the aforementioned industry groups and a value of 0 otherwise.

See Appendix A.

3.3. Methodology

To estimate regression models, we used the OLS, LOGIT, and GMM techniques. We employed two distinct proxies for the mediator variable and three different proxies for the dependent variable in order to improve the robustness of the findings. If heteroskedasticity and/or autocorrelation issues exist, estimate results with OLS may be subject to biasness. Previous research has also shown that an endogeneity problem might arise when examining the connection between CSR disclosure and stock price crash risk [7,8,10]. As a result, we employed the GMM technique to address the endogeneity issues as well as the autocorrelation and heteroskedasticity that are typical in panel data [62–65]. At the same time, we used the Sobel test to evaluate the research hypothesis regarding the role of the mediator variable [10,66–68].

4. Research Results and Discussion

4.1. Descriptive Statistics

Table 1 summarizes the descriptive statistics for the study variables.

Table 1 reveals that both NCSKEW and DUVOL have a positive mean value of 0.192 and 0.006, respectively, indicating that the stock price crash risk of listed firms in the sample is relatively high, similar to what was documented in the context of the US, China, and Malaysia [51,52,69–73]. The CSR variable has a mean of 0.263 and a standard deviation of 0.145. The mean value of the variable ROA is 0.096, indicating that the return on assets is roughly 10 per cent. The ROE variable has a mean value of 0.143, indicating that the return on equity is approximately 14 per cent. The average value of the SIZE variable is 28.237, which corresponds to a total asset worth of nearly VND 10 billion on average. LEV has an average score of 0.246, implying that total debt amounts to approximately a quarter of the total assets. TANG has a score of 0.301, suggesting that tangible fixed assets make up roughly a third of a company's assets. Foreign ownership is represented with an average of 7.004, implying that foreign shareholders own 7% of a firm's stocks. GROW has an average value of 0.191, indicating that the revenue is growing at a high rate. AGE has an average value of 2.792, which corresponds to an average listing age of companies between 16 and

17 years old. The average dividend yield of the businesses in the sample is around 5%, as indicated by the mean value of DIV of 0.049.

Table 1. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
NCSKEW	1237	0.192	1.060	−3.252	5.794
DUVOL	1237	0.006	0.167	−0.582	0.777
CRASH	1237	0.178	0.383	0.000	1.000
CSR	1350	0.263	0.145	0.000	0.939
ROA	1332	0.096	0.091	−0.316	0.589
ROE	1339	0.143	0.309	−7.715	2.488
SIZE	1340	28.237	1.298	23.330	32.254
LEV	1330	0.246	0.188	0.000	0.736
TANG	1340	0.301	0.241	0.000	0.970
FOR	969	7.004	12.614	0.000	80.040
GROW	1317	0.191	0.705	−0.851	9.203
AGE	1340	2.792	0.471	0.693	4.787
DIV	1340	0.049	0.059	0.000	0.570

Source: Author's calculations from research sample.

4.2. Correlation Analysis

Table 2 shows that there is no serious multicollinearity in the model because none of the coefficients have an absolute value greater than 0.9 [74].

Table 2. The correlation matrix.

Variable	DUVOL	CSR	ROA	SIZE	LEV	TANG	FOR	GROW	AGE	DIV
DUVOL	1.000									
CSR	−0.062 *	1.000								
ROA	−0.064 *	0.104 *	1.000							
SIZE	−0.049	0.292 *	−0.234 *	1.000						
LEV	−0.002	0.000	−0.441 *	0.339 *	1.000					
TANG	−0.001	0.046	−0.087 *	0.106 *	0.275 *	1.000				
FOR	−0.055	0.170 *	0.035	0.094 *	−0.055	−0.105 *	1.000			
GROW	−0.061 *	−0.082 *	0.023	−0.016	−0.031	−0.063 *	0.028	1.000		
AGE	0.027	0.113 *	0.007	0.013	0.063 *	−0.083 *	0.115 *	−0.156 *	1.000	
DIV	0.089 *	−0.031	0.241 *	−0.122 *	−0.080 *	−0.023	−0.017	−0.083 *	0.051	1.000

* $p < 0.05$. Source: Author's calculations from Stata.

4.3. Main Results

The main focus of this study was on whether CSR disclosure affects stock price crash risk and whether firm performance acts as a mediator in this relationship. Correlation analysis cannot detect the influence of a factor in the presence of other variables. As a consequence, we employed regression analysis to examine the hypotheses in a more reliable manner. Table 3 shows the regression results using the OLS method.

Table 3. Regression results according to OLS method.

Model/Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	DUVOL	DUVOL	DUVOL	NCSKEW	NCSKEW	NCSKEW
CSR	0.089 *** (5.48)	−0.068 * (−1.95)		−0.059 * (−1.80)	−0.267 (−1.21)		−0.041 (−0.20)
ROA			−0.222 *** (−3.72)	−0.200 *** (−3.33)		−1.619 *** (−4.28)	−1.629 *** (−4.27)
SIZE	−0.010 *** (−5.27)	−0.002 (−0.52)	−0.006 (−1.49)		0.035 (1.33)	0.017 (0.68)	
LEV	−0.195 *** (−14.93)	0.006 (0.22)	−0.031 (−1.07)	−0.041 (−1.44)	−0.082 (−0.48)	−0.370 ** (−1.99)	−0.335 * (−1.87)
DIV		0.237 *** (2.92)	0.311 *** (3.75)	0.308 *** (3.71)	1.360 *** (2.64)	1.888 *** (3.59)	1.846 *** (3.51)
GROW	0.003 (1.07)	−0.014 * (−1.91)	−0.011 (−1.59)	−0.013 * (−1.73)	−0.131 *** (−2.84)	−0.115 ** (−2.52)	−0.116** (−2.53)
AGE	0.004 (0.78)	0.009 (0.79)	0.009 (0.79)	0.01 (0.91)	0.098 (1.40)	0.1 (1.45)	0.1 (1.44)
TANG	0.014 (1.48)						
_CONS	0.390 *** (7.18)	0.05 (0.42)	0.162 (1.40)	0.009 (0.26)	−1.047 (−1.38)	−0.409 (−0.56)	0.078 (0.37)
N	1300	1220	1215	1215	1220	1215	1215
R-SQ	0.227	0.016	0.024	0.025	0.017	0.03	0.03

t statistics in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Author's calculations from research sample.

CSR disclosure, according to Hypothesis H1, has a detrimental impact on stock price crash risk. We validate this negative connection based on the estimation result (Table 3, column 2). The CSR variable's coefficient is negative and statistically significant (-0.068 , $p < 0.1$), suggesting that the higher the amount of CSR disclosure, the higher the stock price crash risk. This conclusion supports the findings of previous research [7,8]. As a result, research Hypothesis H1 receives support.

Table 3 (column 1) demonstrates a positive association between CSR disclosure and firm performance, which supports Hypothesis H2. The CSR variable's coefficient is positive and statistically significant (0.089 , $p < 0.05$), implying that increasing CSR disclosure levels enhances firm performance. Previous research [19–21,49] has shown comparable results. Accordingly, Hypothesis H2 is confirmed.

The coefficients of the variable ROA are all negative and statistically significant (-0.222 , $p < 0.01$; -1.619 , $p < 0.01$) in the model analyzing the relationship between firm performance and stock price crash risk (Table 3, columns 3 and 6), confirming the negative relationship between firm performance and stock price crash risk. This result supports H3 and is consistent with the findings of other studies [2,51,52].

The three-step technique was used to examine the mediating function of firm performance under Hypothesis H4. We determined the correlation between the dependent variable and the independent variable first, followed by the mediator variable and the independent variable and, finally, the dependent variable, independent variable, and mediator variable. The coefficients in Table 3 (columns 2, 3, and 4) are all negative and statistically significant (-0.068 , $p < 0.1$; -0.222 , $p < 0.01$; -0.059 , $p < 0.1$; -0.200 , $p < 0.01$), indicating that both CSR and ROA have a negative influence on DUVOL, and that when

ROA is regulated, the effect of CSR on DUVOL changes (from -0.068 to -0.059). As a result, CSR has an indirect effect on DUVOL, with ROA serving as the mediator variable. Table 3 reveals no similar support for other proxies of the dependent variable (NCSKEW) (columns 5, 6, and 7). Nonetheless, Hypothesis H4 has received some support, implying that firm performance is involved in part of the effect of CSR disclosure on stock price crash risk.

All of the model's control variables had an influence on the dependent variable, which was consistent with earlier research. Firms with high leverage, high dividend yield, and strong sales growth rates, for example, are more likely to produce larger profits and, as a result, suffer less stock price crash risk [7,26,75,76].

We further controlled for the issue of endogeneity using System GMM and present the results in Table 4.

Table 4. Regression results according to GMM method.

Model/Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	DUVOL	DUVOL	DUVOL	NCSKEW	NCSKEW	NCSKEW
CSR	0.083 ** (2.38)	−0.245 *** (−3.28)		−0.227 *** (−3.05)	−1.750 *** (−3.41)		−1.640 *** (−3.21)
ROA			−0.192 * (−1.72)	−0.213* (−1.90)		−1.454 * (−1.89)	−1.894 *** (−2.60)
SIZE	−0.024 ** (−1.98)	0.003 (0.44)	−0.012 * (−1.69)	0.002 (0.27)	0.070 (1.45)	−0.031 (−0.68)	0.045 (0.95)
LEV	−0.126 *** (−2.95)	−0.053 (−0.57)	−0.030 (−0.29)	−0.128 (−1.24)	−0.741 (−1.21)	−0.59 (−0.82)	−1.306 * (−1.85)
TANG	−0.0161 (−0.21)						
FOR	−0.003 *** (−3.47)	0.001 (0.65)	0.001 (0.56)	0.001 (0.38)	0.030 ** (2.46)	0.035 ** (2.32)	0.026 ** (2.22)
GROW	0.016 *** (5.21)	−0.017 *** (−3.28)	−0.016 *** (−2.90)	−0.017 *** (−3.17)	−0.159 *** (−4.48)	−0.144 *** (−3.78)	−0.155 *** (−4.23)
AGE	0.007 (0.82)	0.130 *** (3.27)	0.062 (1.24)	0.138 *** (3.44)	0.684 *** (2.61)	0.397 (1.23)	0.753 *** (2.87)
L.ROA	0.522 *** (6.82)						
L.DUVOL		0.088 ** (2.30)	0.081 * (1.83)	0.086 ** (2.25)			
L.NCSKEW					0.135 *** (3.19)	0.138 *** (3.02)	0.128 *** (3.07)
_CONS	0.738 ** (2.15)	−0.379 (−1.58)	0.19 (0.82)	−0.324 (−1.42)	−3.233 ** (−2.15)	0.058 (0.04)	−2.418 (−1.64)
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	769	691	689	689	691	689	689
AR (2) TEST	0.339	0.595	0.625	0.582	0.322	0.292	0.337
HANSEN TEST	0.244	0.273	0.193	0.327	0.322	0.374	0.434
NUMBER OF INSTRUMENTS	45	57	45	58	57	45	58

t statistics in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Author's calculations from research sample.

Table 4 shows that CSR disclosure has a negative influence on stock price crash risk and that firm performance has a mediating effect. In models of both stock price crash risk proxies, a firm performance-mediated function was established (NCSKEW and DUVOL). The coefficients in Table 4 (columns 2, 3, and 4) are all negatively and statistically significant ($-0.245, p < 0.01$; $-0.192, p < 0.1$; $-0.227, p < 0.01$; $-0.213, p < 0.1$), indicating that both CSR and ROA have a negative influence on DUVOL, and that when ROA is addressed, the effect of CSR on DUVOL changes (from -0.245 to -0.227). Similarly, the coefficients in Table 4 (columns 5, 6, and 7) are all negatively and statistically significant ($-1.750, p < 0.01$; $-1.454, p < 0.1$; $-1.640, p < 0.01$; $-1.894, p < 0.01$), indicating that both CSR and ROA have negative effects on NCSKEW, and that when ROA is controlled, the effect of CSR on NCSKEW changes (from -1.750 to -1.640). As a result, CSR disclosure has an indirect effect on stock price crash risk, with firm performance serving as the mediator variable. The outcomes of the study highlight the need to encourage CSR practice and disclosure, since this is likely to improve firm performance and therefore lower the stock price crash risk.

The research findings support the GMM method's stability. All of the dependent variables' lagged values are positive and statistically significant ($0.522, p < 0.01$; $0.088, p < 0.05$; $0.081, p < 0.1$; $0.086, p < 0.05$; $0.135, p < 0.01$; $0.138, p < 0.01$; $0.128, p < 0.01$). Because the p -values in both the Hansen and AR(2) tests are more than 10%, they are acceptable [62]. Furthermore, the model's control variables all have an influence on stock price crash risk. Firms with large total assets, high financial leverage, and strong sales growth, for example, are more likely to earn larger profits and hence suffer lower stock price crash risk [2,7,55,60,61,75]. Long-standing listed firms, on the other hand, face reputational risk and are thus substantially connected with stock price crash risk [36]. Notably, foreign ownership has a favorable influence on stock price crash risk, confirming the theory that managers of firms with a larger percentage of foreign ownership are incentivized to manipulate the flow of information to the market, making the company's stock more susceptible to stock price crash risk [61].

Finally, while there have been several studies on the relationship between CSR disclosure and stock price crash risk, only a handful have examined both direct and indirect impacts via mediator factors [10]. We are the first to investigate the role of firm performance in mediating the relationship between CSR disclosure and stock price crash risk.

4.4. Robustness Tests

4.4.1. Alternative Measures of Mediator Variable

To improve the robustness of the results on the mediating function, we utilized another proxy of firm performance [2,7]. In all regression models, the proxy ROE was utilized in place of ROA. Table 5 presents the estimation results.

Table 5 indicates that CSR disclosure has a negative (direct and indirect) influence on stock price crash risk, even when the mediator variable is replaced with another proxy. In Table 5, the CSR variable (column 2) has a negative and statistically significant coefficient ($-0.067, p < 0.1$), suggesting a negative association and supporting Hypothesis H1. In Table 5, column 1, the coefficient of the variable CSR is positive and statistically significant ($0.169, p < 0.01$). This validates the study Hypothesis H2 by confirming the favorable relationship. In Table 5, columns 3 and 6, the coefficients of the variable ROE are all negative and statistically significant ($-0.036, p < 0.05$; $-0.292, p < 0.01$). This validates the study Hypothesis H3 by confirming the negative relationship. At the same time, the coefficients in Table 5, columns 2, 3, and 4, are all negative and statistically significant ($-0.067, p < 0.1$; $-0.036, p < 0.05$; $-0.068, p < 0.05$; $-0.033, p < 0.05$), indicating that both CSR and ROE have a negative effect on DUVOL, and that when ROE is controlled, the effect of CSR on DUVOL changes (coefficient from -0.067 to -0.068). This finding backs up Hypothesis H4, confirming that CSR disclosure has a negative relationship with stock price crash risk via firm performance mediation. Table 5's findings reveal no similar support for other proxies of the dependent variable (NCSKEW) (columns 5, 6, and 7). Nonetheless, the

findings' robustness is demonstrated by the fact that when ROA is replaced with another proxy for the mediator variable, the results remain identical (ROE).

Table 5. Regression results when using an alternative measure of mediator variable.

Model/Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROE	DUVOL	DUVOL	DUVOL	NCSKEW	NCSKEW	NCSKEW
CSR	0.169 ***	−0.067 *		−0.068 **	−0.267		−0.116
	(2.69)	(−1.95)		(−2.07)	(−1.21)		(−0.56)
ROE			−0.036 **	−0.033 **		−0.292 ***	−0.287 ***
			(−2.36)	(−2.18)		(−3.05)	(−2.99)
SIZE	−0.009	−0.002	−0.005		0.035	0.025	
	(−1.28)	(−0.52)	(−1.25)		(1.33)	(0.99)	
LEV	−0.140 ***	0.006	0.008	−0.003	−0.082	−0.094	−0.039
	(−2.77)	(0.22)	(0.30)	(−0.13)	(−0.48)	(−0.55)	(−0.24)
DIV		0.237 ***	0.269 ***	0.268 ***	1.360 ***	1.605 ***	1.528 ***
		(2.92)	(3.29)	(3.29)	(2.64)	(3.10)	(2.96)
GROW	0.034 ***	−0.014 *	−0.011	−0.012 *	−0.131 ***	−0.115 **	−0.116 **
	(2.77)	(−1.91)	(−1.57)	(−1.72)	(−2.84)	(−2.49)	(−2.52)
AGE	0.013	0.009	0.008	0.01	0.098	0.099	0.099
	(0.70)	(0.79)	(0.75)	(0.87)	(1.40)	(1.42)	(1.42)
TANG	0.016						
	(0.43)						
_CONS	0.351 *	0.05	0.112	−0.01	−1.047	−0.792	−0.071
	(1.67)	(0.42)	(0.98)	(−0.29)	(−1.38)	(−1.09)	(−0.34)
N	1306	1220	1219	1219	1220	1219	1219
R-SQ	0.02	0.016	0.018	0.02	0.017	0.023	0.022

t statistics in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Author's calculations from research sample.

4.4.2. Alternative Measures of Dependence Variable

To improve the confidence of the results, we utilized another stock price crash risk proxy based on prior research [51,52]. The CRASH proxy was a binary representation of the dependent variable that is utilized in all regression models. The investigation was carried out using a logit regression model. The findings of the regression analysis using the logit model are presented in Table 6.

Table 6 indicates that CSR disclosure has a negative (direct and indirect) influence on stock price crash risk, even when the stock price crash risk variable is replaced with a binary proxy (CRASH). The coefficients of the CSR variable (columns 1 and 4) in Table 6 are all negative and statistically significant ($−3.486$, $p < 0.01$; $−2.871$, $p < 0.01$), suggesting a negative correlation and supporting Hypothesis H1. In Table 6, columns 2 and 5, the coefficients of the variable CSR are all positive and statistically significant (0.089 , $p < 0.01$; 0.169 , $p < 0.01$). This validates the study Hypothesis H2 by confirming the favorable relationship. In Table 6, columns 3 and 6, the ROA and ROE coefficients are all negative and statistically significant ($−8.693$, $p < 0.01$; $−2.993$, $p < 0.01$). This validates the study Hypothesis H3 by confirming the negative relationship. At the same time, the coefficients in Table 6, columns 1, 3, and 4, are all negative and statistically significant ($−3.486$, $p < 0.01$; $−8.693$, $p < 0.01$; $−2.871$, $p < 0.01$; $−7.887$, $p < 0.01$), indicating that both CSR and ROA have a negative effect on CRASH, and that when ROA is controlled, the effect of CSR on CRASH changes (coefficient from $−3.486$ to $−2.871$). Similarly, the data in Table 6, columns

1, 6, and 7, show that the coefficients are all negative and statistically significant (-3.486 , $p < 0.01$; -2.993 , $p < 0.01$; -3.079 , $p < 0.01$; -2.650 , $p < 0.01$), indicating that both CSR and ROE have a negative effect on CRASH, and that when ROE is controlled, the effect of CSR on CRASH changes (coefficient from -3.486 to -3.079). This finding backs up Hypothesis H4, confirming that CSR disclosure is negatively related to stock price crash risk, and firm performance mediates this relationship. As a consequence, the findings are robust since the results are unaffected when we replace stock price crash risk with a binary proxy for the dependency variable (CRASH).

Table 6. Regression results when using an alternative measure of dependent variable.

Model/Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	CRASH	ROA	CRASH	CRASH	ROE	CRASH	CRASH
CSR	-3.486^{***} (-5.20)	0.089^{***} (5.48)		-2.871^{***} (-4.16)	0.169^{***} (2.69)		-3.079^{***} (-4.54)
ROA			-8.693^{***} (-5.64)	-7.887^{***} (-5.19)			
ROE						-2.993^{***} (-4.31)	-2.650^{***} (-3.77)
SIZE	-0.287^{***} (-3.97)	-0.010^{***} (-5.27)	-0.473^{***} (-6.17)	-0.374^{***} (-4.71)	-0.009 (-1.28)	-0.436^{***} (-5.88)	-0.332^{***} (-4.31)
LEV	0.691 (1.52)	-0.195^{***} (-14.93)	-0.236 (-0.49)	-0.365 (-0.75)	-0.140^{***} (-2.77)	0.74 (1.60)	0.512 (1.08)
DIV	-6.797^{***} (-2.95)		-3.035 (-1.41)	-3.394 (-1.57)		-4.146^* (-1.87)	-4.440^{**} (-2.02)
GROW	-0.125 (-1.03)	0.003 (1.07)	-0.008 (-0.07)	-0.051 (-0.47)	0.034^{***} (2.77)	0.016 (0.14)	-0.033 (-0.31)
AGE	-0.414^{**} (-2.13)	0.004 (0.78)	-0.381^{**} (-2.03)	-0.367^* (-1.92)	0.013 (0.70)	-0.392^{**} (-2.06)	-0.368^* (-1.90)
TANG		0.014 (1.48)			0.016 (0.43)		
_CONS	8.673^{***} (4.29)	0.390^{***} (7.18)	13.701^{***} (6.26)	11.578^{***} (5.18)	0.351^* (1.67)	12.171^{***} (5.78)	9.991^{***} (4.62)
N	1220	1300	1215	1215	1306	1219	1219
R-SQ		0.227			0.02		

t statistics in brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Author's calculations from research sample.

4.4.3. Sobel Test

The Sobel test for the mediating effect is shown in Table 7. It can be observed that the mediating effect of firm performance on the link between CSR and stock price crash risk is carried out in two distinct ways, using two separate dependent variable measurements.

Table 7. Sobel test.

Model/Dependent Variable	DUVOL			NCSKEW		
	Estimates	Delta	Monte Carlo *	Delta	Sobel	Monte Carlo *
Indirect effect	−0.007	−0.007	−0.007	−0.068	−0.068	−0.069
Std. Err.	0.004	0.004	0.004	0.029	0.029	0.03
z-value	−1.782	−1.782	−1.753	−2.363	−2.363	−2.32
p-value	0.075	0.075	0.08	0.018	0.018	0.02
Conf. Interval	−0.015, 0.001	−0.015, 0.001	−0.017, −0.001	−0.125, −0.012	−0.125, −0.012	−0.136, −0.020
(Indirect effect/Total effect)	(0.007/0.073) = 0.099			(0.068/0.136) = 0.502		
(Indirect effect/Direct effect)	(0.007/0.066) = 0.110			(0.068/0.068) = 1.008		
Baron and Kenny approach	the mediation is partial			the mediation is complete		
Zhao, Lynch, and Chen's approach	direct-only nonmediation			indirect-only mediation		

* $p < 0.1$. Source: Author's calculations from research sample.

The degree of the direct and indirect impact of CSR disclosure on stock price crash risk is shown in Table 7. As a result, the indirect effect/total effect ratio is 0.099, implying that ROA mediates approximately 10% of CSR's influence on DUVOL. The mediated impact is roughly 0.1 times as great as the direct effect of CSR on DUVOL, as measured by the indirect effect/direct effect ratio of 0.110. Similarly, the indirect effect/total effect is 0.502, indicating that ROA mediates nearly half of the effect of CSR on NCSKEW. The mediated impact is roughly 1.0 times as great as the direct effect of CSR on NCSKEW, as measured by the indirect effect/direct effect ratio of 1.008. The mediations are partial and full, respectively, using two distinct proxies for the dependent variable, DUVOL and NCSKEW, according to the Baron and Kenny method (66). Following Zhao, Lynch, and Chen's method (68), we have direct-only nonmediation and indirect-only mediation using two distinct proxies for the dependent variable, DUVOL and NCSKEW. Finally, based on prior studies (66–68), we conclude that CSR disclosure has a negative influence on stock price crash risk, with a mediating effect of firm performance.

5. Conclusions

Prior research attempted to establish a link between CSR disclosure and stock price crash risk. A number of recent studies have backed up the complex nature of the relationship, focusing on both direct and indirect impacts while also elucidating the function of mediating factors. We performed tests on 225 firms listed on Vietnam's stock exchange between 2014 and 2019. The study's goal was to investigate the influence of CSR disclosure on stock price crash risk and determine whether firm performance works as a mediating variable in this relationship.

The following are the contributions to the literature review on the impact of CSR. To begin with, we find that CSR disclosure has a negative influence on the stock price crash risk of listed firms in Vietnam. Social Impact Theory is more consistent with this negative relationship than Balance Theory. CSR disclosure serves the interests of the company's shareholders and stakeholders, promotes information transparency for firms, prevents managers from bad news hoarding, and therefore reduces stock price crash risk. Second, for the first time, our research demonstrates that firm performance plays a mediating role in the link between CSR disclosure and stock price crash risk. We use alternative proxies for the mediator and dependent variables, the Sobel test, and the GMM technique to control for potential endogeneity problems, and the research results remain robust. The study

importantly implies the necessity for companies in emerging countries such as Vietnam to undertake CSR disclosure. Disclosed CSR can bring many benefits to the enterprise rather than the content of information disclosure. CSR disclosure, moreover, may be a win–win strategy for all stakeholders. On the one hand, shareholders’ and stakeholders’ interests are protected. Companies, on the other hand, can boost firm performance while lowering stock price crash risk.

Managers will learn from the research findings that non-financial information can contribute to the prediction of stock price risk. Furthermore, financial performance information has a direct and indirect impact on the chance of a stock price crash risk. For investors, the findings of the study support the importance of non-financial data in building stronger portfolios by anticipating the likelihood of stock price crash risk with more data from the entity’s financial and non-financial disclosures. The findings of the study could be used to develop rules and corporate evaluation procedures: the disclosure of non-financial information should be encouraged and should be used in evaluating firm risk.

The study has some limitations and research directions are suggested as follows. Firstly, the study was conducted with a limited sample size, with a selection of companies announcing CSR, with a set of listed non-financial firms accounting for 90% of Vietnam’s stock market capitalization. Therefore, the study does not cover smaller listed firms with very limited CSR disclosure. Therefore, future studies can consider a sample of small firms to compare with the research results presented in this paper. Second, the impact of CSR disclosure on stock price crash risk needs to be considered in many business areas. This study did not include financial companies. In future research, it is possible to compare the research results with the research sample in the financial field.

Author Contributions: Conceptualization, C.T.M.T., N.V.K. and N.T.L.; Formal analysis, C.T.M.T., N.V.K. and N.T.L.; Investigation, N.T.L.; Methodology, C.T.M.T., T.Q.T. and N.T.L.; Writing—original draft, C.T.M.T., T.Q.T., N.V.K. and N.T.L.; Writing—review & editing, N.T.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research is funded by the University of Economics and Law, Vietnam National University Ho Chi Minh City, Vietnam.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from secondary data via Eikon Refinitive.

Data Availability Statement: The data will be made available on request.

Acknowledgments: We would like to thank two anonymous reviewers.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Variable	Definition
DUVOL	The log of the ratio of down week to up week standard deviations in firm-specific weekly returns (7,55).
NCSKEW	The negative skewness of firm-specific weekly returns over the duration of the fiscal year (7,55).
CRASH	The binary variable has a value of 1 if the firm has at least one crash week each year, and 0 otherwise (2).
ROA	The proportion of earnings before taxes to total assets.
ROE	The proportion of earnings before taxes to equity.
CSR	The content analysis approach is used to create an index that shows the level of corporate social responsibility disclosure.
SIZE	The logarithm of total assets.
LEV	Total liabilities divided by total assets is known as the debt-to-equity ratio.
TANG	The proportion of tangible fixed assets to total assets.
FOR	The percentage of foreign holdings remained stable at the start of the year.

Variable	Definition
GROW	The rate of revenue growth
AGE	The age of the firm's listing logarithm.
DIV	The dividend yield ratio is the ratio of annual value of dividends paid to a security's market value per share.
INDUSTRY	A vector of binary variables with a value of 1 if the company is in one of the eight industrial categories (Basic Materials, Consumer Cyclical, Consumer Non-Cyclical, Energy, Healthcare, Industrial, Technology, and Utilities), and a value of 0 otherwise

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