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Corporate Social Responsibility Disclosure and Firm's Productivity: Evidence from the Banking Industry in Bangladesh

Yubin Zheng [1]**, Md. Harun Ur Rashid** [2] **, Abu Bakkar Siddik** [3,]*** **, Wei Wei** [1] **and Syed Zabid Hossain** [4]

[1] School of Economics and Finance, Xi'an Jiaotong University, Xi'an 710061, China; qwzheng@stu.edu.cn (Y.Z.); wei_wei@mail.xjtu.edu.cn (W.W.)

[2] Department of Economics & Banking, International Islamic University Chittagong, Chattogram 4318, Bangladesh; harunais88@gmail.com

[3] School of Economics and Management, Shaanxi University of Science and Technology, Xi'an 710021, China

[4] Department of Accounting and Information Systems, University of Rajshahi, Rajshahi 6205, Bangladesh; syed6205@gmail.com

* Correspondence: ls190309@sust.edu.cn; Tel.: +86-15686012117

Abstract: Since the empirical evidence on the relationship between corporate social responsibility disclosure (CSRD) and firm productivity is scarce in the context of the banking industry, the study examines whether CSRD leads banks in Bangladesh to higher productivity. Using annual report data of all 30 banks listed on the Dhaka Stock Exchange in Bangladesh from 2011 to 2018, the study applied a data envelopment analysis (DEA) to determine the productivity of the sample banks, and then ordinary least squares (OLS) analysis to examine the impact of CSR on the banks' productivity. Furthermore, the study utilized two-stage least squares (2SLS) and a generalized method of moments (GMM) to check the robustness of the findings amid the detection of endogeneity issues. The study also used several alternative variables to check and verify the reliability of the study. The findings indicate that the greater a bank's contribution to CSR, the higher its productivity. However, banks with more debt to assets are less productive. Additionally, the study observed that the impact of CSRD on bank productivity is higher in GRI banks compared to non-GRI banks, non-politically connected banks as opposed to politically connected banks, and conventional banks compared to Islamic banks. The study provides valuable insight into how CSR activities can promote bank productivity, thus motivating the banks to execute a well-thought-out action plan to ensure more CSR contribution. This study is the first ever bank-level evidence that provides insight into how the patterns of CSR activity of publicly traded banks impact their productivity.

Keywords: CSR disclosure; total factor productivity; bank performance; banking industry; Bangladesh

1. Introduction

Whether corporate social responsibility disclosure (CSRD) enhances firm performance has become a subject of debate among academic researchers over the years. Despite the many studies on the link between CSRD and business performance, controversy still remains on whether and how CSR induces firm productivity [1,2]. In terms of economic cost–benefit analysis, CSR may increase the cost burden of firms due to charitable contributions, employee improvement, community development, and setting up pollution-reduction procedures [3]. It also generates minimal offsetting benefits, reduces performance, and competes with value-maximizing activities [4]. On the other hand, higher CSR engagement leads firms to better financial performance [5], profitability [6,7], efficiency [8], and productivity [2]. Socially responsible firms maintain higher ethical standards and disclose high-quality accounting information [9,10]; CSR leads them to lower financial risk and easier access to finance [11]. More CSR not only promotes the sustainable development of

society, enhances brand images, strengthens refinancing abilities, and attracts funds with lower interest rates, but also provides better competitive advantages [12,13]. Stoian and Gilman [14] have, thus, reported that environmental-related CSR practices attract better workers and managers and, in turn, lead companies to higher productivity and efficiency.

Due to the bank's unique position in the economy, they have made a significant contribution to social and environmental causes [15]. Different stakeholders of banks are also interested to know their CSR performance along with financial performance, since the banks play a crucial role in investing decisions. Their CSR initiatives not only boost their public image, but also impact the social behavior of other businesses. CSR knowledge is critical for assessing investor and lender risk, maintaining regulators' goodwill, and increasing public trust in the financial system. Moreover, the stock market crash and numerous financial scandals in the banking industry demand banks restore their credibility and reputation in the eyes of public opinion [6]. Therefore, in response to the widespread decline in public trust and increased demand for transparency from investors, the banking industry has become more reactive to CSR [16], CSR disclosure [17], and ESG (environmental, social, and governance issues) [18].

Prior researchers have investigated the relationship between CSR and financial performance. Most recently, current studies have focused on the impact of CSR on banks [8] and firm efficiency in Vietnam [19], investment efficiency in Taiwan [11], firm productivity in China [2] and the USA [20,21], the financial performance of US firms in the presence of productivity [1], and quality sustainability disclosure and firm value in Asian countries [22]. However, most of the studies are conducted in developed economies like the USA and China. Specifically, existing studies have failed to focus on the impact of CSR on efficiency and productivity in developing countries where weak corporate governance exists [11]. Meanwhile, developed economies (e.g., the USA) enjoy effective corporate governance, which leads firms to better firm efficiency [23]. Hence, it is crucial to investigate whether firms in an emerging economy such as Bangladesh are committed to CSR disclosure to engender better productivity in the presence of weak corporate governance.

The majority of the prior studies on the relationship between CSR and firm productivity are in the context of non-financial sectors such as manufacturing [1,19,24], chemical [21], and food and beverage companies [20]. Meanwhile, only a few studies exist on the impact of CSR on financial performance [7] and efficiency [8] in the context of the banking sector. Although there is ample evidence of the agreement between CSR and the productivity of non-financial companies, minimal and inconclusive evidence exists from the perspective of the banking sector. As banks are responsible for providing the finance to drive innovation, economic growth, and prosperity, they play a crucial role in the sustainable development of an economy. Research on banks' sustainability has seen notable progress in recent years, and CSR disclosure is becoming increasingly essential for banks' sustainable investment and growth [7], albeit strong demand for banks' CSR reports from stakeholders, such as governments, media, and societies [16,25]. Since banks profit from business engagement with society, different stakeholders often put pressure on them to engage in CSR [26]. However, whether the banks' CSR positively impacts their financial performance remains a controversial issue. On the one hand, banks may be uninterested in CSR due to the additional costs associated with the implementation of CSRD strategies [8]. On the other hand, banks' involvement in CSR will enhance their reputation, consequently promoting their better financial performance. Banks are often criticized by civil society for their dissatisfactory stewardship commitment towards firms that negatively affect the environment, undermine human rights, and adversely impact local communities. Although banks do not directly affect the environment and society, they can influence the businesses they finance to undertake pro-environmental activities.

The justification for conducting this study in an emerging country setting like Bangladesh is the gradual increase in the publication of sustainability reports. The Bangladesh Securities and Exchange Commission (BSEC) has declared its commitment to ensuring that the listed institutions disclose their sustainable performance. Although BSEC introduced

Corporate Governance Guidelines in 2012 [27], CSR issues and the environmental impacts of listed firms have not been dealt with extensively. In June 2018, BSEC issued a Corporate Governance Code for direct CSR reporting of the listed firms. Moreover, BSEC circulated a gazette notification on financial reporting and disclosure of corporate information on the internet in August 2018. Despite the initiatives, the CSR disclosure [26] and firms' productivity [28] remain unsatisfactory for the listed banks in Bangladesh. The majority of developing countries, like Bangladesh, have not implemented international sustainability reporting standards, such as the Global Reporting Initiative (GRI) and the United Nations (UN) Global Compact [29]. In the context of an emerging economy like Bangladesh, the adoption of such structured reporting practices could boost the legitimacy and acceptance of formation among various stakeholder groups. Whether the CSR disclosure following international standards leads banks to better productivity needs to be examined.

Furthermore, Bangladesh's fragile democracy, poor governance, and political unpredictability provide a particular motivation to raise awareness of CSR disclosure [30]. Moreover, prior studies in the context of CSR disclosure in Bangladesh witnessed that CSR is mostly employee-related [31]. Belal and Cooper [32] documented that the engagement of Bangladeshi publicly traded firms in CSR disclosure is lower compared to developed countries. Moreover, due to political intervention, banks have been heavily criticized for their high non-performing loans, lack of good governance, money laundering, and mismanagement in the banking sector in Bangladesh. This ultimately affects the banking sector's efficiency and productivity, as well as constraining firms and sectors that truly could expand and become a pillar of strength for the long-term growth of the economy. It is also crucial to ensure efficiency and productivity in the banking industry for the proper functioning of the banking system. However, the banking sector has recently shown the prolific growth of Islamic banks. The demand for Shariah-based banking products has been increasing over the years [33]. Currently, 10 full-fledged Islamic banks are operating in Bangladesh, in which investment and deposit growth have reached 13.61% and 15.05%, respectively, from 2018 to 2019 [34]. As Shariah-based banks are considered more ethical than their counterparts, they are expected to contribute more to CSR activities. Because CSR and its disclosures are becoming increasingly important in the banking industry in general, and in the Islamic banking industry in particular, it is critical to determine whether the rising market share and financial productivity have any relevance to CSR practices and disclosures [17]. Does CSR performance motivate the banks' productivity under GRI reporting, political connection, and Shariah-based division in Bangladesh?

Unlike the prolific CSR literature, there is a dearth of academic evidence regarding the relationship between CSR and firm productivity, especially total factor productivity (TFP). TFP can measure how a firm utilizes its inputs to improve output efficiency [2]. CSR disclosure improves firms' TFP, influencing many developments, including technical and technological innovation, better distribution, and the utilization of capital and human resources. Due to its profound and lasting effect on productivity, TFP is one of the foremost predictors of firm financial performance [28]. Hence, this study raises the following question:

RQ: Does CSRD have a significant impact on TFP in the banking sector in Bangladesh?

To answer this question, this study examines the relationship between the CSRD of the banking industry and their TFP. Furthermore, the outcome of this study will contribute to the existing literature in the following ways. First, by providing theoretical support for the potential mechanism of the CSRD–TFP relationship, this study uncovers the extent of CSRD's influence on banks' productivity. Second, the study empirically examines the impact of investment in CSR on TFP. Third, some banks follow GRI guidelines when preparing their sustainability reports, while other banks do not. Therefore, the study examines whether the impact of CSRD on TFP varies between GRI-following firms and non-GRI-following firms. Fourth, as politicians influence banks' strategic decisions such as CSR performance [6], the study examines whether there is any difference in the relationship between CSR and TFP between politically and non-politically connected banks

in Bangladesh. Fifth, the Bangladeshi banking industry consists of two genres of banks: conventional banks and Shariah-based banks. According to Johnes et al. [35], there is a significant variation in the productivity and operational outcomes of these two types of banks. Therefore, the study investigates whether there exists any significant difference in the relationship between CSR and TFP of these two categories of banks. Sixth, this study applies 2SLS and GMM to check the robustness of the baseline findings, albeit in the presence of endogeneity issues. Finally, the study further examines whether there is any difference in the CSRD–TFP relationship between GRI firms and non-GRI firms, politically connected and non-politically connected firms, and conventional banks and Shariah-based banks.

The remaining part of the paper is structured as follows. Section 2 sheds light on the theoretical development, reviewing the literature underpinning the development of the hypothesis. Section 3 presents the key concepts and methodology. Section 4 analyses and discusses the results, and the conclusion is provided in the final section.

2. Literature Review

Prior studies have explained the relationship between CSR and TFP from stakeholders' perspectives. Stakeholder theory is a theory of organizational management and business ethics that refers to morals and values in the operation of an organization [21], which relates to CSR. Furthermore, the relationships between various stakeholders such as investors, personnel, and communities have a significant impact on the firm's success. Stakeholder theory is largely responsible for bank productivity and asserts the role of the board of directors and owners in determining the organization's desired goals. It emphasizes that the key to organizational success is proper relationship building with management [6,9,28].

CSR and Firm Productivity

Prior studies have found a positive relationship between CSR and firm productivity [1,19–21,24]. The business environment in the developing country is becoming more competitive over time due to digitalization and technological changes [36], and requires the banks' involvement in CSR to remain competitive [37]. The different dimensions of CSR engagement provide banks with more competitive advantages, which ensure better financial performance. Apart from the common notion that CSR practices assist banks in developing a strong image and reputation, thereby providing a range of advantages to improve firm productivity, the positive association can also be explained in several ways.

First, based on stakeholder theory, CSR practices enable banks to build a strong relationship with key stakeholders, which boosts their ability to implement innovative technology, produce new products, and enter new markets [1]. The high success of CSR and the improved credibility that comes with it have the potential to increase consumer loyalty and attract consumers away from competitors [38]. In addition, with a strong reputation and increased credibility for better CSR performances, banks may be able to attract new customers and charge a higher interest rate on loans, resulting in the better financial performance of the banks [8]. Moreover, the sustainable disclosure practices of a firm through CSR implementation send signals to stakeholders and the community to disclose their sound financial stability [39].

Second, in the banking industry, employees are considered key stakeholders who are involved in a business's CSR policies [37]. Their socially responsible activity brings a positive effect on banks' financial performance. CSR-related programs can assist banks in developing human capital and increasing productivity [40]. For example, employee stock ownership plans or long-term employee benefit plans enhance the ability of firms to recruit and retain sought-after employees [8]. Moreover, better CSR performance can promote the retention of skilled employees, lower absenteeism rates, and reduce voluntary turnover rates [1,41]. From the standpoint of productivity, better input utilization can increase employee productivity and loyalty, thus contributing to the improved management of human capital. CSR increases labor stability, raises firm productivity, and reduces the risk

of knowledge transfer to competitors [1]. The employee benefits related to CSR activities increase employee productivity, which in turn improves banking performance [42].

Third, strong stakeholder relationships enable businesses to obtain various resources while also assisting them in making effective use of those resources [1]. For instance, if a bank adopts strong CSR policies, the customer may consider a lower interest rate on their deposits [25]. From the bank's viewpoint, a low cost of deposits is equivalent to a low-cost input. According to Kim et al., firms tend to borrow more from banks that have a good reputation even if the rate of interest on their loan is high [43]. Furthermore, CSR may raise interest and non-interest earnings, thereby increasing bank productivity [8].

Finally, engaging in CSR activities can be an effective tool to achieve social legitimacy [44]. Therefore, firms with higher CSR engagement are more effectively involved with stakeholders whose participation in business activities increases the firms' efficiency [1]. Moreover, CSR, as a promotional tool, increases product awareness and reduces market price sensitivity [45], as higher CSR disclosure is associated with higher share prices and vice versa. As a result, CSR can smoothen market fluctuations, generate new demand, command a premium price, and positively shift firm productivity. Based on the above discussion, we propose the following hypothesis:

Hypothesis 1. *CSRD positively influences firm productivity in the banking industry.*

3. Research Methodology

3.1. Sample Size and Data

This study uses panel data collected from the annual reports and websites of 30 listed banks in Bangladesh over eight years (from 2011 to 2018) to determine the firms' productivity. Consequently, we gathered and investigated a sample of 210 firm years (from 2011–2012 to 2017–2018) to evaluate the impact of CSRD on bank productivity. We collected CSR data from the CSR disclosures, corporate governance disclosures, directors' reports, statements of the chairman, and the financial statements included in the annual reports of individual banks. On the other hand, we collected CSR performance data from Bangladesh Bank's website. To determine the Total Factor Productivity (TFP), we also compiled the required input and output variables from the annual report. Previous research has found that the annual report is a more reliable source of corporate disclosure than other channels of communication, such as the business website [6,26].

3.2. Estimating Productivity: The Malmquist Productivity Index (MPI)

The study uses the Malmquist Productivity Index (MPI) to determine the TFP via a non-parametric output-oriented frontier method of data envelopment analysis (DEA). Sten Malmquist introduced MPI as an index to show the change of productivity between two points of time, like t and t + 1 [28,46].

MPI does not require any input and output prices for the firms' performance measurement, as it is free to take any behavioral assumptions. For this, MPI is better than other indexes [46], and it also allows decomposition to identify the reasons for productivity change [47]. TFP has two parts: technical efficiency change (TEC) and technological change (TC) [28]. The efficiency of the decision-making unit (DMU) is known as TEC. The equilibrium mixture of inputs and outputs through the utilization of higher technology and modern equipment in the production process is known as TC [48]. The Malmquist Index for TFP denotes the geometric mean of two specific points of time when TEC and TC favor the DMU [28]. This study adopts an output-oriented MPI that follows the following formula [49]:

MPI > 1 indicates positive change,
MPI < 1 indicates negative change.

$$M_0 = (Y^{t+1}, X^{t+1}, Y^t, X^t) + [\frac{d_0^t(x^{t+1},y^{t+1})}{d_0^t(x^t,y^t)} \times \frac{d_0^{t+1}(x^{t+1},y^{t+1})}{d_0^{t+1}(x^t,y^t)}]^2 \tag{1}$$

$$M_0 = \frac{d_0^t(x^{t+1}, y^{t+1})}{d_0^{t+1}(x^t, y^t)} \times [\frac{d_0^t(x^{t+1}, y^{t+1})}{d_0^t(x^t, y^t)} \times \frac{d_0^{t+1}(x^{t+1}, y^{t+1})}{d_0^{t+1}(x^t, y^t)}]^2 \tag{2}$$

$$M_0 = \text{TEC} (Y^{t+1}, X^{t+1}Y^tX^t) \times \text{TC} (Y^{t+1}, X^{t+1}Y^tX^t) \tag{3}$$

TEC has two parts: pure technical efficiency (PTE) and scale efficiency (SE).

$$\text{TEC} = \frac{D_{vrs}^{t+1}(x^{t+1}, y^{t+1})}{D_{vrs}^t(x^t, y^t)} [\frac{D_{crs}^{t+1}(x^{t+1}, y^{t+1}) \Big/ D_{vrs}^{t+1}(x^{t+1}, y^{t+1})}{D_{crs}^t(x^t, y^t) \Big/ D_{vrs}^t(x^t, y^t)}] \tag{4}$$

PTE denotes output maximization by minimizing wastage, while SE is a kind of productive efficiency that focuses on the best fruitful scale.

According to Färe et al. [49], here:

D_{crs} = constant output function,
D_{vrs} = variable output function.

In order to estimate MPI, the method adopted in this work combines VRS with an output-oriented model. Prior studies have favored this strategy above others such as output-oriented CRS, input-oriented CRS, and input-oriented VRS due to some of its key qualities, such as increased outreach, enhanced synergies, and superior implications in a bad economy [28]. While working in DEAP, VAR shows both increasing and decreasing returns to scale, whereas CRS simply shows constant returns to scale. As a result, the VRS output-oriented model was chosen over the CRS in this investigation.

To estimate the TFP, we used four inputs, namely, assets, deposit, interest expenses, and non-interest expenses, and three outputs including loan, interest income, and non-interest income [8,28].

3.3. Dependent Variable

The study uses the MPI as an extension of the DEA developed by Malmquist to estimate the TFP score of each bank. Similar to many prior studies, we have used MPI to estimate the banks' TFP as a popular indicator of productivity [28,35]. Shah et al. [50] also used MPI to evaluate the banks' performance and productivity. TFP, being the dependent variable, is a measure of productivity or economic efficiency, and is the output of economy-wide total production divided by the weighted average inputs. Over the period, economists have linked output with inputs, arguing that TFP is a significant source of growth. As TFP is not directly computable, it is estimated to measure efficient productivity and resource misallocation in micro-production units (e.g., firms or plants) [1]. TFP developments are an outcome of factors such as technological innovation, better allocation and utilization of resources, human capital accumulation, and market fluctuations. Further, we used ROA and ROE as alternative variables of TFP to check the robustness of the findings.

3.4. Independent Variable

The study used CSR disclosure (CSRD) as an independent variable. We developed a CSR disclosure index (CSRDI) by gathering 22 items related to CSR from the five board categories: environment, community, employee, product, and service-related information [6,26]. There are two common approaches to measuring CSRD to score each of the items under different categories. First, the disclosure quantities of a CSR report are considered, such as the number of particular keywords, number of pages of the report, and descriptive sentences. The other is to score the disclosure quality of the report using content analysis—a method by which one can codify the text or content for measuring each of the items [51]. In this case, we developed the CSRDI by giving a score of "1" if the company publishes CSR items, and "0" otherwise. We awarded one point for each of the 22 items disclosed by the sample banks. We further used a second CSR disclosure metric that takes

into account the weights and depths of different aspects of CSR information presented in the reports to check the robustness. Following the study of Wiseman [52], we scored monetary disclosures three points, quantitative but non-monetary disclosures two points, and nonquantitative disclosures one point. The total CSRDI result for a bank (*j*) is calculated using the following method:

$$CSRDI_j = \frac{\sum_{i=1}^{n} Score_{ij}}{\sum_{i=1}^{n} Score_i} \tag{5}$$

where *Score_i* represents the maximum result given for all bank categories, and *Score_ij* presents the total number of items a bank disclosed. Moreover, we used CSR expenditure as an alternative measurement of CSR disclosure to check the robustness of our model.

3.5. Control Variables

We used age, ROA, leverage, audit, and accounting expert as control variables in line with prior studies [1,21,26]. Moreover, by enhancing the market implications of disclosure, the auditor plays a crucial role in boosting the credibility of voluntary disclosure [6]. If these variables are controlled, the relationship between CSR and TFP can be measured adequately.

3.6. Data Estimation Model

To examine the relationship between the TFP and CSRD, we used the following ordinary least squares (OLS) regression. We also added some control variables to check the robustness of this model. Further, we used two-stage least squares (2SLS) and generalized method of moments (GMM) to check the robustness of our findings, albeit the presence of endogeneity issues.

$$TFP_{it} = \alpha_0 + \beta_1\, CSRD_{it} + \beta_2\, AGE_{it} + \beta_3\, ROA_{it} + \beta_4\, LEV_{it} + \beta_5\, AUDIT_{it} + \beta_6\, AE_{it} + \varepsilon_{it} \tag{6}$$

The variables are defined in Appendix A. Here, TFP = total factor productivity received by each sample bank, and it is the dependent variable; CSRD = CSR disclosure; β_1 to β_6 = the coefficients of the variables; α_0 = the constant; ε_{it} = the error term; and 'i' and 't' = the number of banks and period, respectively.

4. Results Analysis and Discussion

4.1. Total Factor Productivity

The banks holding an average TFP score of more than 1 are considered productive. During the entire study period, the first three years were unproductive for the sector, as the average TFP score was below 1 (see Appendix B). There is a significant increase in the productivity of the banking sector in the financial years from 2014–2015 to 2017–2018. The highest average productivity is 1.08 in the financial year 2016–2017. This result indicates that the productivity of Bangladeshi banks is increasing day by day. Despite this, the level of productivity is still insufficient, as only seven of the sample banks had an average TFP score greater than 1. This implies that there is ample scope for the banking sector to develop its productivity.

4.2. Descriptive Analysis

Table 1 represents the descriptive statistics of 30 listed banks in Bangladesh, where mean, standard deviation (SD), and the minimum and maximum values show the overall performance of these banks. The dependent variable, TFP, has a mean of 1 and an SD of 0.22. There is significant variation in the TFP scores among the selected banks, with the difference between the minimum (0.481) value and the maximum (3.333) value being 2.851. The independent variable, CSRD, has a mean of 17.11, which falls between 11 and 21, and a standard deviation of 1.88. As the mean result is close to the maximum score, it can be said that the majority of banks disclosed their CSR-related information. There are wide fluctuations in ROA and ROE among the banks in Bangladesh, ranging from −7.02 to 2.81 and −7.62 to 23.4, respectively.

Table 1. Descriptive statistics.

Variables	Obs.	Mean	Std. Dev.	Min	Max
TFP	210	1.00	0.22	0.481	3.333
Int. income	240	15,682.52	8584.01	351	67,166
Non-int. income	240	2908.83	1841.80	64.9	8981.1
Loan	240	146,130.30	98,987.83	8633	805,759
Int. exp	240	10,765.07	5443.36	338	37,999
Non-int. exp	240	8992.60	50,659.29	455.39	705,648.9
Assets	240	213,068.60	127,874.70	11429	997,430
Deposit	240	168,172.10	106,411.80	10,893.98	822,573
CSRD	210	17.11	1.88	11	21
ROA	210	0.79	1.12	−7.02	2.81
ROE	210	10.9	4.88	−7.62	23.4
AE	210	1.07	1.41	0	8
AUDIT	210	4.43	0.95	3	6
AGE	210	24.00	9.63	11	46
GRI	210	0.4	0.49	0	1
PC	210	0.47	0.50	0	1

4.3. Correlation

Table 2 shows the pairwise correlation coefficients between the pair of variables used in this study. It highlights the positive or negative interrelationship between two variables at a certain level of significance. The findings showed that CSRD has a positive and statistically significant association with TFP, while leverage has a negative and significant association with TFP. These findings imply that higher CSRD as against lower debt can lead a bank towards greater productivity.

Table 2. Pairwise correlations.

	TFP	CSRD	AUDIT	AE	ROA	LEV	AGE
TFP	1						
CSRD	0.164 **	1					
AUDIT	0.065	−0.145 **	1				
AE	0.035	−0.201 ***	0.158 **	1			
ROA	−0.015	0.218 ***	−0.027	−0.187 ***			
LEV	−0.143 **	0.301 ***	−0.138 **	0.163 **	0.040	1	
AGE	−0.040	−0.145 **	0.026	0.426 ***	−0.232 ***	0.204 ***	1

** $p < 0.05$, *** $p < 0.01$.

4.4. Multicollinearity Test

The study ran some tests on the panel data to ensure that our model fit well. One of these was a multicollinearity test. Multicollinearity occurs when one predictor variable in a multiple regression model can be predicted linearly from the others with a high degree of accuracy. Multicollinearity is a criterion for determining whether or not the independent variables are correlated. When a data set has a high level of multicollinearity, it is called a collinearity problem. When the correlation coefficient between any two variables exceeds 0.90, the problem of multicollinearity arises [53]. The strongest correlation coefficient between age and accounting specialists is 0.426, which is less than 0.90, as shown in Table 2.

As a result, there is no collinearity problem in this study. The study used the variance inflation factor (VIF) test to confirm whether or not the model had collinearity. Table 3 shows that all of the values were less than 10 [54]. As a result, we may say that the study is devoid of multicollinearity issues.

Table 3. Regression results.

	(1)	(2)	(3)	(4)
		VIF	TFP	TFP
CSRD		1.57	0.171 **	0.133 **
			(0.073)	(0.054)
ROA		1.24	−0.305	−0.579
			(1.458)	(1.481)
LEV		1.26	−0.179 **	−0.178 **
			(0.085)	(0.084)
AGE		1.38	−0.011	−0.007
			(0.016)	(0.017)
AE		1.36	0.067	0.071
			(0.074)	(0.074)
AUDIT		1.04	0.007	0.005
			(0.005)	(0.005)
Year dummy			Yes	Yes
Constant			1.009 ***	1.030 ***
			(0.096)	(0.092)
N			210	210
F			1.462	1.509
r2			0.082	0.084
r2_a			0.026	0.028

Standard errors in parentheses: ** $p < 0.05$, *** $p < 0.01$.

4.5. Regression Analysis

We applied the OLS model to examine the impact of CSRD on TFP. Column 3 (awarded equal points for all items) and column 4 (provided three points for monetary disclosures, two points for quantitative but non-monetary disclosures, and one point for nonquantitative disclosure items in measuring CSRD) of Table 3 demonstrate that CSR disclosure positively influences the TFP at a 5% significance level. The coefficients of both columns indicate that with a 1% increase in CSRD, TFP increases by 0.171% and 0.133%, respectively. The result implies that the higher a bank discloses CSR, the greater the possibility of the bank's TFP. A substantial contribution to CSR enhances the reputation and trustworthiness of a firm. It increases the loyalty of the existing customers and attracts new customers away from competitors [38], which encourages a bank to charge a higher interest rate on loans and achieve better financial performance [8].

Among the control variables, leverage has a negative impact on TFP, which suggests that the more the amount of debt to total assets, the lower the TFP. The higher amount of debt causes a higher amount of interest, which makes the bank less productive. As the external debt incurs more cost, bank productivity is reduced. Hence, banks should manage more internal capital instead of depending on the debt. However, all other control variables, ROA, age of the banks, audit committee, and bank size showed an insignificant impact on TFP. Under both models, the results are similar, indicating the robustness of our findings.

4.6. Robustness Analysis

To check the robustness of our baseline model, we ran several additional models with alternative dependent and independent variables. In column 2 of Table 4, we used CSR expenditure instead of CSR disclosure. The results showed that CSR expenditure (B = 0.012; $p < 0.05$) positively influences TFP. This implies that the more a firm invests in CSR, the greater its productivity; the results are consistent with our baseline model. In column 3, we used BIG4 in place of the audit committee, and it was found to have a negative effect of BIG4 (B = 0.024; $p < 0.10$) on TFP. As auditing the firms' financial statements by BIG4 is more costly than the internal audit committee, it may decrease financial performance. However, all other results are similar to the baseline model.

In columns 4 and 5, we utilized alternative dependent variables, ROA and ROE. Under both models, CSR disclosure had a positively significant relationship with TFP, supporting the baseline model. The impact of accounting experts is insignificant under both of these models. Although leverage exhibited a significantly positive impact on ROE, its positive association with ROA was not significant. Finally, in column 6, we used the four dimensions of CSRD, among which community and product-related CSR disclosure were found to have a significant impact on TFP. As the banks contribute more to community-related CSR and improve their products to attract more customers, they become more productive and attain better financial performance. The findings also suggest that banks focus more on environmental issues and employee benefits to enhance their TFP.

Table 4. Robustness test.

(1)	(2)	(3)	(4)	(5)	(6)
	TFP	TFP	ROA	ROE	TFP
CSRD		0.165 ***	0.011 ***	0.005 ***	
		(0.055)	(0.002)	(0.001)	
CSRE	0.012 **				
	(0.006)				
ROA	−0.272	0.102			−0.288
	(1.478)	(1.510)			(1.508)
LEV	−0.254 ***	−0.146 *	0.003	0.090 **	−0.216 **
	(0.097)	(0.086)	(0.004)	(0.040)	(0.085)
AGE	−0.007	0.003	−0.001	0.005	−0.000
	(0.017)	(0.017)	(0.001)	(0.007)	(0.001)
AE	0.029	0.077	−0.004	−0.002	0.014 **
	(0.074)	(0.073)	(0.004)	(0.003)	(0.006)
AUDIT	0.008		−0.000	0.000	0.003
	(0.005)		(0.000)	(0.003)	(0.005)
BIG4		−0.024 *			
		(0.012)			
Environment					−0.009
					(0.008)
HR					0.003
					(0.007)
Community					0.022 ***
					(0.007)

Table 4. *Cont.*

	(1)	(2)	(3)	(4)	(5)	(6)
Product						0.017 **
						(0.008)
Year dummy	Yes	Yes	Yes	Yes	Yes
Constant	0.976 ***	0.972 ***	0.001	−0.106 **	1.014 ***
	(0.138)	(0.096)	(0.004)	(0.042)	(0.085)
N	210	210	210	210	210
F	1.631	1.794	5.034	22.048	2.048
r2	0.093	0.099	0.219	0.498	0.128
r2_a	0.036	0.044	0.175	0.475	0.066

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.7. Additional Tests

The study also conducted some additional models, investigating the relationship between CSRD and firm productivity in GRI-adopting, politically connected, and *Shariah*-compliant firms (see Table 5). The findings showed that CSRD is a significant influencing factor of financial performance in GRI firms, consistent with prior studies [55]. As a result of following GRI guidelines, firms that carry out environmental and social disclosure foster more stakeholder trust. Bangladeshi banks may use the results of this study to draw ethical investors and legitimize their social activities. While measuring CSR performance, GRI guidelines may be more reliable indicators for sustainability performance than traditional measures. For an accurate evaluation of firm value, stakeholders should also consider corporate sustainability reports, as it helps accomplish the broader objective of sustainable growth. The integration of sustainability reporting with a solid business plan can help to achieve a long-term competitive advantage [55]. The findings also recommend taking necessary initiatives by the regulators to force banks to comply with GRI guidelines while reporting their sustainability.

The results also showed that CSR disclosure instigates a firm's productivity in non-politically connected firms. These imply that if a firm is free from political affiliation, its board feels more independent and tries to protect the interests of all stakeholders. As a result, they invest more in CSR activities that enhance firm productivity [26]. On the other hand, politically connected firms strive to ward off the potential risk of disobeying social commitments linked with the perceived poor performance of CSR and CSRD [6]. Therefore, this study encourages banks to avoid the inclusion of politicians on their boards.

Further, the study compares the impact of CSRD on firm productivity between Islamic and conventional banks. The findings showed that CSRD instigates firm productivity more in traditional banks. As Islamic banks have an implicit commitment toward CSR, which is primarily based on philanthropic activities, their CSR disclosure may be lower than the explicit CSR strategies shown by conventional banks [56]. One explanation for the positive impact of CSRD on firm productivity in interest-based banks is their potentially high commitment to CSR to gain public confidence. The findings of this study suggest that Islamic banks' sustainable strategies need to be revised to compete with conventional banks. In this regard, the bank management should focus more on explicit CSR strategies linked to their core businesses and imbibe a beyond-philanthropy CSR culture to assist them in contributing to human wellbeing, in line with the objectives of *Shariah* [56].

Table 5. OLS under different categories of banks.

	(GRI)	(Non-GRI)	(Political)	(Non-Political)	(Islamic)	(Conventional)
	TFP	TFP	TFP	TFP	TFP	TFP
CSRDI	0.010 **	0.005	0.006	0.007 *	0.004	0.009 **
	(0.005)	(0.003)	(0.004)	(0.004)	(0.006)	(0.003)
ROA	−0.211	0.816	3.032	−2.314	−4.708	1.020
	(2.507)	(1.936)	(2.429)	(1.847)	(4.102)	(1.669)
LEV	−0.266 *	−0.177	−0.150	−0.202 *	0.030	−0.208 *
	(0.152)	(0.110)	(0.162)	(0.115)	(0.204)	(0.105)
AGE	−0.001	−0.000	−0.000	−0.001	0.001	−0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)
AE	0.019 **	0.004	0.010	0.014	−0.017	0.015 **
	(0.009)	(0.008)	(0.009)	(0.009)	(0.020)	(0.006)
AUDIT	0.004	0.005	0.015 *	−0.001	0.008	0.006
	(0.009)	(0.007)	(0.009)	(0.007)	(0.015)	(0.006)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.046 ***	1.010 ***	0.921 ***	1.091 ***	0.900 ***	0.984 ***
	(0.171)	(0.098)	(0.177)	(0.098)	(0.161)	(0.116)
N	84	126	98	112	49	161
F	1.307	0.972	1.827	1.014	0.384	2.310
r2	0.166	0.086	0.189	0.100	0.103	0.146
r2_a	0.039	−0.003	0.086	0.001	−0.164	0.083

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.8. Endogeneity Issue

4.8.1. Two-Stage Least Square (2SLS)

Finally, to fix potential endogeneity problems, the study ran the 2SLS regression in Table 6. The presence of endogeneity was examined using Durbin and Wu–Hausman tests, in line with prior studies [9,57]. The results suggest that CSRD (Durbin = 3.68, *p* value = 0.05; Wu–Hausman = 3.48, *p* value = 0.06, F test = 0.00) suffers from endogeneity bias. To address this, the study selected a one-year lagged value of CSRD as the IVs [6].

In the first stage of the study, the endogenous variable was utilized as the dependent variable, while other exogenous factors were employed as the independent variables. In the second stage, we substituted the endogenous variable (lagged data) with the fitted value of the endogenous variable. The instrumental lagged values are very significant in the current year of CSRD, as shown by the first stage regression in column 2 of Table 6. The study found a significant and beneficial influence of CSR disclosure in the second stage when the fitted value of CSRD produced from the first stage was employed. Furthermore, the effect of accounting experts on firm productivity was minimal in column 1, while the study showed similar results to the baseline model in the second stage. For the first stage of the 2SLS regression, we employed F-statistics and discovered that the cut-off point is greater than the threshold of 10 [58]. Therefore, the study concludes that the IVs are reliable and valid for 2SLS regression.

Table 6. Endogeneity tests.

1	2	3	4
	(First stage)	(Second stage)	(GMM)
	TFP	TFP	TFP
CSRD (fitted value)		0.018 ***	0.008 ***
		(0.006)	(0.003)
$CSRD_{t-1}$	0.008 ***		
	(0.003)		
L.TFP			0.208 **
			(0.093)
ROA	0.187	−1.393	1.143
	(1.519)	(1.792)	(1.067)
LEV	−0.195 **	−0.281 ***	−0.161 ***
	(0.088)	(0.102)	(0.050)
AGE	−0.011	−0.001	0.004
	(0.016)	(0.017)	(0.010)
AUDIT	0.005	0.009	0.008 ***
	(0.006)	(0.006)	(0.002)
AE	0.009	0.011 *	0.001
	(0.006)	(0.006)	(0.003)
Year dummy	Yes	Yes	Yes
Constant	1.042 ***	0.889 ***	0.742 ***
	(0.099)	(0.121)	(0.144)
N	180	180	180
F			82.654
r2	0.109	0.047	
r2_a	0.051	−0.016	
AR (1) (*p* value)			−4.73 (0.000)
AR (2) (*p* value)			−0.06 (0.949)
Sargan test (*p* value)			62.45 (0.028)
Hansen test (*p* value)			21.29 (0.998)

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.8.2. Two-Step System Generalized Method of Moments (GMM)

In addition, to account for the lag time of the interpreted variables, this study regressed using a dynamic panel model. In line with previous research, we used GMM to deal with the possibility of endogeneity and heteroskedasticity [2,59]. The presence of a lagged dependent variable among the right-hand side variables in the equations complicates estimation since the lagged dependent variable is linked to the disturbance term. Arellano and Bond devised a difference GMM estimator for coefficients in the equations stated above, where the regressors' lagged levels are the instruments for the equation in the first differences to overcome this problem [60]. To make instruments exogenous to the fixed effects, Arellano and Bover [61] and Blundell and Bond [62] recommended differencing

instruments rather than the regressors. This will lead to the System GMM estimator, a mutual estimate of the equation in levels and first differences based on the difference GMM. According to Wintoki et al. [63], the principle of the validity of GMM estimation results is that the residual terms have a first-order rather than second-order autocorrelation. As a result, following Liang et al., we used the lag term of productivity as an explanatory variable in the two-step system GMM regression shown in column 4 of Table 6 [2]. To validate the model's intensity and validity, we used diagnostic measures, such as approximate coefficients. The study also used the *Sargan–Hansen* test to examine the *overall validity* of the instruments, AR (1), AR (2), and the F test, as well as instrumental variables [6].

The GMM regression results, as shown in column 4 of Table 6, are close to the baseline model presented in Table 3; the principal explanatory variable, i.e., CSR, continues to have the dominating effect on bank productivity. As a result, the GMM estimation results demonstrate the robustness of our model in the face of endogeneity.

5. Conclusions

Research on CSR and firm productivity has drawn wide attention recently. In this study, we examined the relationship between CSRD and firm productivity using DEA under different categories of firms. We found a significant and positive impact of CSRD on firm productivity after addressing the robustness and endogeneity issues, using 2SLS and GMM. We also documented the relationship between the CSRD and firm productivity of different categories of firms.

Overall, our findings add to the banking and CSR literature by demonstrating that banks may benefit from adopting CSR policies if those policies have the potential to increase productivity. In the competitive market, the study provides valuable insight to the management of the banks to understand how CSR activities play a role in achieving firm productivity. The findings of the research can motivate firms to implement sound strategies for ensuring greater CSR contribution.

The study findings have many implications for stakeholders, including policy planners, regulators, and investors. First, the bank executives develop CSR capabilities to gain financial benefits that lead to increased bank productivity. Investing in CSR is not a waste of resources, but rather is a better utilization of resources to increase productivity. Second, CSR enhances firm productivity for the GRI firms, implying that the regulatory bodies should emphasize the compliance of banks to GRI guidelines for their reporting of sustainability performance. Third, this study discourages firms from exhibiting political connections, as it has no significant impact on the relationship between CSR and firm productivity. The research discourages banks from including politicians in their boards. Finally, our research has implications for investors, as it demonstrates how CSR credentials can influence the operation, productivity, and, consequently, the profitability of banks. When a firm invests more in CSR activities, the productivity of the firm will increase. Likewise, when a bank invests in CSR, people will trust the bank more, thereby encouraging further and bigger investment in the bank. Overall, the findings suggest that companies should expand their CSR activities to achieve firm productivity, as a proper contribution to CSR results in greater loyalty of stakeholders and better financial performance.

The study has several limitations. First, we only considered listed banks in Bangladesh, which does not represent the whole financial sector of the country. Future researchers should consider the financial sector as a whole with a large sample size from across countries. Second, since Bangladesh is a developing country, the output of this study may not apply to developed countries. Hence, future research should include data from developing countries alongside developed countries. Third, the research is based on a single country, which may be subjected to selection bias. Future research can explore the influence of CSR on firm productivity with a cross-country investigation. Despite the limitations, we believe that the opening trend on the relationship between CSR/CSRD and the productivity/efficiency of firms can be further examined and confirmed by future research on the issue.

Appendix A

Table A1. Variables measurements.

Variables	Elaborations	Definitions and Measurement
Outputs		
Interest Income	Interest income	Income from interest
Non-interest income	Non-interest income	Income generated from non-core activities
Loan	Loan	The portion of the deposit that has been lent to the borrower
Inputs		
Interest exp	Interest expense	Interest payable on borrowings
Non-interest exp	Non-interest expense	Expenses other than interest payments on deposits and bonds
Assets	Total assets	Any resource owned by a business or an economic entity
Deposit	Total deposits	The fund is collected from depositors
Dependent variable		
TFP	Total factor productivity	The ratio of aggregate output to aggregate inputs
Independent variables		
CSRDI	CSR disclosure index	CSRDI is developed under two common approaches: one is awarding an equal point for all items taking the scores of "1" if a company discloses its CSR items, and "0" otherwise; and another is providing three points for monetary disclosures, two points for quantitative but non-monetary disclosures, and one point for nonquantitative disclosure items.
CSRE	CSR expenditure	The total amount of CSR spending by each of the sample banks
Additional variables		
GRI	Global Reporting Initiatives	If a firm prepares a sustainability report following GRI guidelines, it is coded as 1; otherwise, it is coded as 0
PC	Political connection	If a bank has a politician or his/her family members as a major shareholder or a director, it is coded as 1; otherwise, it is coded as 0
ISLAMIC	Islamic banks	If a bank complies with *Shariah* completely, it is coded as 1; otherwise, it is coded as 0

Table A1. *Cont.*

Variables	Elaborations	Definitions and Measurement
	Control variables	
ROA	Return on assets	Net income divided by total assets
ROE	Return on equity	Net income divided by total equity
AGE	Firm's age	Number of years in business
LEV	Leverage	Total long-term debt divided by total assets
AUDIT	Audit committee team members	Number of members in the audit committee
AE	Accounting experts	Number of accounting experts on the board who hold professional degrees like CA and CMA
BIG4	Audit quality	This is calculated as a dummy variable set to 1 if one of the BIG4 companies audits the bank and 0 otherwise.

Appendix B

Table A2. Total factor productivity.

ID	Bank Name	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	Average
1	Rupali Bank	0.842	0.923	1.193	1.023	0.764	1.054	0.625	0.918
2	AB Bank	0.974	0.837	1.11	1.037	0.936	1.059	1.018	0.996
3	Al Arafah Islami Bank	0.94	0.964	1.003	1.001	0.991	2.255	0.481	1.091
4	Bank Asia	0.926	0.943	0.989	0.973	1.056	1.077	1.032	0.999
5	BRAC Bank	1.045	1.056	0.985	1.056	1.126	1.002	0.866	1.019
6	Dhaka Bank	0.897	0.95	0.895	0.957	1.009	1.034	1.099	0.977
7	DBBL	0.945	0.994	1.047	1.122	1.125	1.207	1.015	1.065
8	Eastern Bank	0.969	0.85	1.036	0.995	1.02	1.013	1.003	0.984
9	Exim Bank	0.973	1.015	0.963	0.973	0.949	1.003	1.043	0.988
10	FSIB	0.979	0.949	0.989	0.944	0.987	0.999	1.054	0.986
11	ICB	0.859	0.554	1.049	1.073	1.043	0.976	0.987	0.934
12	IFIC	0.965	0.843	1.018	1.067	1.000	1.011	1.016	0.989
13	IBBL	0.956	0.903	1.068	1.098	1.057	1.026	1.008	1.017
14	Jamuna	0.871	0.955	0.919	1.029	1.077	1.048	1.023	0.989
15	Markentile	0.689	1.028	0.994	0.992	1.027	1.017	0.984	0.962
16	MTBL	0.613	1.079	0.977	0.91	0.941	0.958	1.047	0.932
17	National Bank	0.815	0.929	0.901	0.993	1.033	1.04	1.076	0.970
18	NCC	0.937	0.86	0.936	0.992	1.023	0.994	1.017	0.966
19	One Bank	0.927	0.975	1.010	0.937	0.968	1.051	1.042	0.987
20	Premier Bank	0.967	0.853	0.953	1.043	1.038	1.036	1.068	0.994
21	Prime Bank	1.652	0.49	0.886	1.019	1.089	1.096	3.333	1.366
22	Pubali Bank	0.926	0.831	0.996	1.049	1.057	1.042	0.988	0.984
23	Shahjalal Islami Bank	1.026	0.893	0.876	0.97	1.035	1.04	1.005	0.978
24	Social Islami Bank	0.922	1.042	0.933	1.053	0.996	0.989	1.04	0.996
25	Southeast Bank	1.099	0.694	0.937	0.988	0.968	1.057	1.023	0.967

Table A2. *Cont.*

ID	Bank Name	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	Average
26	Standard Bank	0.953	0.882	0.959	0.902	0.944	1.068	1.019	0.961
27	City Bank	0.99	0.882	1.044	1.005	0.968	1.091	1.055	1.005
28	Trust Bank	0.884	1.089	1.085	1.008	0.925	1.154	0.972	1.017
29	United Commercial Bank	1.013	1.01	1.02	0.998	0.966	1.022	0.848	0.982
30	Uttara Bank	0.957	0.546	1.052	0.997	0.976	1.043	1.086	0.951
	Average	0.95	0.89	0.99	1.01	1.00	1.08	1.06	1.00

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