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THE IMPACT OF MANDATORY CSR DISCLOSURE ON FIRM EFFICIENCY IN AN EMERGING COUNTRY

Thi-Khanh KIEU[1, 2], Cong-Hoang NGUYEN[1*], Shu-Hsing WU[1]

[1]*College of Management, Chang Jung Christian University, Tainan, Taiwan*
[2]*Faculty of Banking and Finance,*
Thai Nguyen University of Economics and Business Administration, Thai Nguyen, Vietnam

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Abstract. The government in emerging economies often moves firstly in issuing regulations to push the firms follow some social commitments. Natural resource-based firms in Indonesia are the first movers to be required for mandatory CSR disclosure. This study explores how the efficiency of those firms was affected under such the regulations. The sample includes Indonesian firms listed on the Indonesia stock exchange in 2009–2019, and the data is analysed by data envelopment analysis and difference-in-differences method with 506 treatment and 2,536 control firm-year observations. The results express the positive impact of mandatory CSR disclosure on firm efficiency. This study also suggests the policy makers to provide clear standards in regulations, and consider expanding the applicable objects. Managers should utilize this regulation as an effective tool to develop and manage the companies' annual plan, and improve firm performance.

Keywords: mandatory CSR disclosure, firm efficiency, natural resource-based firms, emerging economy, data envelopment analysis, difference-in-differences.

JEL Classification: M14, K20.

Introduction

A business with good social practices could have better performance thanks to less-spending in managing the relationship with its stakeholders (Jones, 1995), increasing competitiveness, and enhancing efficiency (Eccles et al., 2014). Corporate social responsibility (CSR) is a strategic action that can constitute an effective legal shield as a license-to-operate for businesses (Liu & Tian, 2021). CSR refers to how corporations attribute their resources to take responsibility for improving society and the environment in the long-term, which extends beyond mere economic and legal strategies (McWilliams & Siegel, 2001). Firms consider CSR as a crucial tool to integrate stakeholders' interest into management control systems, especially, government regulations, in relation to shape corporate citizenship (Freeman, 2010;

*Corresponding author. E-mail: *andyvn@mail.cjcu.edu.tw*

Rinawiyanti et al., 2020). It also creates added value through efficiency resource allocation among various stakeholders (Ioannou & Serafeim, 2017; Weber, 2008) with a relative cost advantage (Jones, 1995) regarding to reduce cost of operations (Garg & Gupta, 2020), reducing political and compliance costs (Wang & Li, 2016).

CSR has received markedly increased attention due to the continuous problems of environmental destruction, resource scarcity and social issues, which are also consequences of business activities. World sustainable economic development requires firms to disclose their activities (Usunier et al., 2011). The number of companies that develop processes to govern, drive, and communicate sustainability efforts has increased dramatically their global exposure (Ioannou & Serafeim, 2017). This trend is the result of voluntary actions by companies, and on the other hand, may be the consequence of governments' regulations. There has been an increase in reporting regulations to encourage companies to improve their environmental, social, and governance performance. For example, the Danish Financial Statements Act mandates large companies to report their social response with an annual management review; the Johannesburg Stock Exchange in South Africa, the Shanghai Stock Exchange, and the Shenzhen Stock Exchange in China, The Bursa Malaysia Stock Exchange implemented the Compulsory CSR Reporting Framework, which requests publicly listed companies to report CSR activities (Ioannou & Serafeim, 2017). Indonesia is no exception to this trend with the enactment of its government regulation No. 47/2012 on Corporate Social and Environmental Responsibility to expand the implementation of the compulsory CSR activities of listed firms in relation to natural resource. Under this regulation, the mandatory CSR disclosure requirement has been extended, and companies have to include CSR funding in their annual operating plan, approved by the board of directors, and disclose such CSR funding in the companies' annual reports to the shareholders.

For natural resource-based firms, the efficiency is an important key for their performance. It can be defined as productivity per unit cost in case of maximizing outputs or minimizing inputs (Farrell, 1957; Stuebs & Sun, 2009b). The CSR investments of resource-intensive firms could gain benefits beyond economic value (Su et al., 2020). Vilanova et al. (2009) confirmed that firm efficiency as one of five pillars of corporate competitiveness in relation to CSR practices. The application of mandatory disclosure of CSR information makes firms accountable for the interest of stakeholders, deals with agency conflict between stakeholders (European Commission, 2011; Friedman, 2007). Following requisite regulations on responsibility reporting could enhance firms' transparency, increasing their discipline, motivating them to perform better in socio-environmental aspects of their operations and gaining social legitimacy from the surrounding community, which, in turn, can affect firm efficiency (Liu & Tian, 2021; Vilanova et al., 2009).

Mandatory disclosure of non-financial information is seen under pressure of political and social expectations to fulfil legal obligations, thus, some stakeholders do not acknowledge their benefit in mandatory CSR disclosure regime (Garg & Gupta, 2020; Wang & Li, 2016). Moreover, many researches have paid attention to understanding the influence of CSR on corporate performance but only in a voluntary context (O'Sullivan & Sheffrin, 2003; Rahim, 2021; Shaikh, 2022; Stuebs & Sun, 2009b). In the trend of transitioning to mandatory disclosure of CSR, research exploring its impact on firm efficiency is still limited.

Indonesia as a fast developing economy has many "corporations operating in natural resource-related businesses, such as mining, plantations and forestry" (Eriandani & Winarno, 2021). Under the world's expectations, it is not surprised that Indonesia is known as the leading country in Southeast Asian to apply a compulsory CSR regulatory approach focusing firstly on natural resource-related firms (Zainal, 2020). Consequently, doing business with more responsibility is a legitimate tool for the business strategy of almost Indonesian businesses (Eriandani & Winarno, 2021). Honest CSR claims are seen as substantive CSR actions and, as such, affecting positively their stakeholder perception and business performance (Schons & Steinmeier, 2016). Rinawiyanti et al. (2020) indicated that, in manufacturing field, if CSR implementation is integrated in strategy, it can improve firm competitiveness through employee and operating performance.

Stemming from the lack of empirical studies on the impact of mandatory CSR disclosure on firm efficiency, especially in the context of natural resource-based firms, this study aims to explore how mandatory CSR disclosure affect the efficiency of natural resource-based firms in Indonesia with two research questions (1) if there is an impact of mandatory CSR disclosure on the firm efficiency, and (2) how change in the efficiency before and after the application of mandatory CSR? Data envelopment analysis (DEA) approach is a non-parametric method to calculate the technical efficiency of each listed firm in the Indonesian sample. By using difference-in-differences (DID) design, the results indicated that mandatory CSR regime can lead to a positive change in technical efficiency of complying firms in comparing with their counterparts. The study provides support for the monitoring role of mandatory CSR disclosure in an emerging economy that can be generalized to other developing/emerging ones that are considering the adoption of mandatory CSR regulations.

The rest of the paper is structured as follows. Section "Literature review" briefly reviews theoretical background, institutional background, and discuss insights from literature on mandatory CSR disclosure and firm efficiency. Section "Methodology" presents the data, sample selection, and the research methods used in this study. Section "Results" presents the empirical results on the impact of mandatory CSR disclosure on firm efficiency. Section "Discussion and Implications" provide key findings as well as implications for managers and policy-makers. Section "Conclusions" summarizes the research findings, presents limitations, as well as offers possible avenues for future research.

1. Literature review

1.1. Theoretical background

CSR is becoming a global phenomenon, and enhancing CSR awareness is an important strategy to shape in the mind of stakeholders a positive corporate perception (Usunier et al., 2011). CSR does not solely constitute charity, but also contributes to the added value of the business, such as a positive image of the company to society, increasing employee and customer satisfaction, as well as other factors that need to be included when measuring business performance (Weber, 2008). However, it also represents the current costs that may not be accompanied by any commensurate reimbursement in the present (Brammer & Millington, 2008).

Maximizing value for the business requires value maximization for stakeholders (Freeman, 2010). Phillips et al. (2003) acknowledges that stakeholder theory refers to the actors involved in the decision-making process as well as the subjects affected by those decisions, and procedures and regulation legislation are viewed as an input to CSR. Stakeholder theory argues the need to fulfil public requirements toward subjects who affect or will be affected by corporate actions (Freeman, 2010). Although meeting stakeholder' needs is included in the business strategy, determining how to achieve the best balance among the interests of stakeholders can be markedly challenged due to the finite business resources. Carson (1993) stated that corporate executives have active duties to promote the interests of all stakeholders, but duties to some stakeholders are more important than that to others. Compliance with laws and government requirements in CSR implementation is obligatory and prioritized by businesses.

The enterprises must enter into a social commitment, in which their manager must comply with certain social requirements in order to achieve its goals, other rewards, and ultimate existence. The terms of this commitment can be clearly seen as law, but some provisions are not strictly defined, depending on the expectations of the social community towards the business (Guthrie & Parker, 1989). Legitimacy theory, in explaining CSR behavior of enterprises, possesses two basic aspects. First, businesses form their citizenship through legalization tools, and secondly, create benefits through the process of carrying out legal activities (Mohamed et al., 2014; Rodriguez-Fernandez, 2016). However, legitimacy theory is only seen as an incentive to reveal CSR from a management perspective, but not a real effort for society at large, and "...may or may not promote transparency and accountability towards non-capital provider stakeholder groups" (Owen, 2008). Therefore, in emerging economies or developing countries, the government often has a first movement in issuing regulations or law policy to firstly push the business to follow some social commitment. Indonesia is an example of this action as explained below.

1.2. Institutional background

Indonesia is a developing economy and the only country in Southeast Asia to become a member of the group of 20 largest countries in the world (G-20) (Rinawiyanti et al., 2020). Many of their corporations operate in natural resource-related businesses such as mining, plantations and forestry (Eriandani & Winarno, 2021). Practicing CSR in Indonesia is expected to create many positive impacts on community.

Indonesia is a leading country in Southeast Asia to apply a compulsory CSR regulatory approach (Zainal, 2020). The CSR tendency in Indonesia was stirred up by the collapse of the New Order regime in the early 1990s. Then, Indonesian Business Link and Business Watch Indonesia was established in 2001 and 2002 respectively, to orient companies to CSR practice through the principles of responsible business to stakeholders and pursue media engagement on CSR issues. This assisted in bringing CSR awareness into community programs and activated the draft mandatory regulation in 2007 (Rosser & Edwin, 2010). With the implementation of Indonesia Company Act No. 40, Indonesia made CSR implementation compulsory for listed companies engaged in natural resource businesses or activities related to natural resource businesses.

As of 2012, after five years of implementation of the Company Act No. 40/2007, the establishment of compulsory CSR regulation in Indonesia has faced substantial objection, mainly from the private sector. Debates about whether CSR shall be mandatory or voluntary in nature continued, and resulted in blurred CSR program implementation (Andrini, 2016). Furthermore, as a consequence of competitive interests among economic growth and stakeholder protection, the nation often provides special treatments, such as tax deductions or less stringent environmental norms to attract foreign investment while Indonesian companies lack requisite knowledge and skills to implement CSR (Waagstein, 2011). In that context, further provisions concerning corporate social and environmental responsibility are regulated in Government Regulation No. 47 issued in 2012 to extend the effect of Article 74 of Company Act No. 40 of 2007 on listed firms (Law of the Republic of Indonesia, 2007, 2012). This constitutes an expansion of the CSR disclosure requirement. Article 3 in the regulation states that *"Social and environmental responsibility … shall be mandatory for companies that carry on business in a natural resource-based or a natural resource-related field, as provided by law."* Regarding Article 5, companies must have direct planning, allocate the operational budget for CSR, disclose it in their annual report, and be accountable for it at the general meeting of shareholders. The requiring CSR disclosure aims to sustainable growth and reaches stated sustainable development goals by 2030. Accordingly, this study focuses on elucidating the impact of Government Regulation No. 47 of 2012 on firm technical efficiency of publicly-traded firms in the Indonesia Stock Exchange for 11 years from 2009 to 2019.

1.3. Mandatory CSR disclosure and Firm efficiency

The firm efficiency is one of five pillars in shaping firm competitiveness along with financial performance, quality, image and innovation (Vilanova et al., 2009). Economically, efficiency is achieved when a firm relies on a given amount of inputs to maximize output (input-orientation), or minimize inputs to produce a given amount of a certain output (output-orientation) (Farrell, 1957; Ngo, 2010). In other words, efficiency can also be assessed as productivity per unit cost (Stuebs & Sun, 2009b). As a result, a company can achieve higher firm efficiency if it whether maximizes its outputs (i.e. revenues, productivity) or minimizes its inputs (i.e. costs, expenses).

CSR initiatives represent the current costs incurred by the company that may not be accompanied by any commensurate reimbursement (Brammer & Millington, 2008). Through corporate governance, social investments, managers on the board want to maximize their own self-interest to achieve their own goals, and may not align with shareholder values (Friedman, 2007; Jensen, 2010; Lin et al., 2016). The application of mandatory disclosure of CSR information makes firms accountable for the interest of stakeholders, deals with agency conflict between stakeholders, and create firms' advantages (European Commission, 2011). Compliance with CSR regulation is not only a legitimate tool to promote social programs, build public trust based on information transparency and reporting (Freeman, 2010), but also to increase firm efficiency as a consequence of cost leadership or an outstanding of CSR differentiation, at the expense of shareholders (Friedman, 2007).

Ioannou and Serafeim (2017) explored the implications of environmental, social, and corporate governance disclosure requirements in four countries (i.e., China, Denmark, Malaysia, and South Africa), and showed that an increase in sustainability claims is associated with the availability of information, less in information asymmetry, therefore, possibly encouraging companies to adopt efficiency techniques in production and management. This is consistent with study of Liu and Tian (2021) which explored mandatory CSR disclosure of listed companies in China, and indicated that mandatory CSR disclosure provides controlling shareholders with a better legal obligations shield in business activities, assisting to improve the investment efficiency of enterprises such as reducing investment time, especially in cases of over-investment. Compliance with CSR regulations to meet stakeholders' interests motivates stakeholders' willingness to support corporate actions and improve firm efficiency through allocating resources effectively among various stakeholders (Ioannou & Serafeim, 2017; Weber, 2008). As a result of "doing well by doing good", businesses reduce transaction costs in creating and maintaining stakeholders' relationships, which in turn facilitate them to access crucial resources, enhance productive efficiency, reduce cost of capital and risk management (Bhattacharyya & Rahman, 2019).

CSR mandatory legislation not only positively affects firm efficiency in relation to reduce operational costs, better relative price of products over competitors, improve competitive advantage with loyalty customer base (Garg & Gupta, 2020), but also shape legitimacy with authority and community which, in turn, give compliance and political cost advantages (Wang & Li, 2016). Indeed, positive CSR can create an effective competitive advantage for companies in managing stakeholders' relationships as insurance-like effects (Eccles et al., 2014; McWilliams & Siegel, 2001; Shiu & Yang, 2017), gain social legitimacy (Liu & Tian, 2021), secure a cost advantage (Jones, 1995; Wang & Li, 2016), and has been shown to be related to firm efficiency (Stuebs & Sun, 2009a). Extensive research by Stuebs and Sun (2009b) has revealed the positive impact of CSR on firm efficiency. In addition, Rahim (2021) proved that the listed firm efficiency evaluated by using DEA method was found a positive change due to environmental disclosures. Especially, the CSR investments of resource-intensive firms could gain benefits beyond economic value (Su et al., 2020). Indonesia has many firms operating in natural resource field, therefore, compliance with CSR regulations not only avoid any legal penalties, gain recognition from both internal and external stakeholders, but also achieve greater efficiency and effectiveness for their outcome (Rinawiyanti et al., 2020). Based on aforementioned, this study tries to extend prior literature by empirically examining and verifying the positive relationship between mandatory CSR disclosure and firm technical efficiency. Two hypotheses are proposed in this study:

H1: Mandatory CSR disclosure will impact the natural resource based firm efficiency in Indonesia.

H2: The natural resource-based firms' efficiency is positively changed with mandatory CSR disclosure implementation.

2. Methodology

2.1. data and sample selection

In this study, the firm efficiency is measured by using DEA – a mathematical programming non-parametric model which provides a measurement of performance efficiency (Charnes et al., 1978). The sample includes Indonesian companies listed on the Indonesia Stock Exchange for the period 2009–2019. The authors start our sample in 2009 to separate the impact of the global financial crisis event in 2008. To test the impact of mandatory CSR disclosure, the data analysis was divided into two phases, including the period before policy implementation (2009–2012) and the post-implementation period (2013–2019). Year of 2013 was determined as the beginning of the influence of the Government Regulation to examine the effectiveness of the regulation on firm efficiency in Indonesia.

All firms in the sample are subject to Indonesian Government Regulation No. 47 of 2012. After exclusion, a sample of 277 firms for each year corresponding to 3,047 firm-year observations was kept. To allow comparisons between treatment and control groups, we identify firms that are treatment ones in the sample by applying the firm inclusion criteria stated by Government Regulation No. 47 of 2012 based on 4-digit SIC code of businesses in some specific industries: mining; agriculture, forestry, fishing; manufacturing related to natural resource-based; the remaining businesses of those industries are considered as the control group. Then, 506 treatment firm-year observations and 2,541 control firm-year observations were obtained to select for analysis.

After manually-defining the treatment and control groups, to test the hypothesis, the authors construct a matching sample using nearest neighbour propensity score matching (PSM) with a command without replacement. The matched sample was used to make a comparison between the treatment and control groups. The final sample includes 3,042 firm-year observations, with 506 observations of treatment group and 2,536 matching control observations as shown in Table 1.

Table 1. Sample description by industry – PSM sample (source: author's calculation)

Industry	Firm-years	Percentage (%)
Agriculture, Forestry, Fishing	88	2.89
Construction	297	9.76
Finance, Insurance, Real Estate	108	3.55
Manufacturing	1,319	43.36
Mining	275	9.04
Retail Trade	187	6.15
Services	176	5.79
Transportation and Public Utilities	361	11.87
Wholesale Trade	231	7.59
Total	3,042	100

2.2. Data analysis

2.2.1. Firm efficiency evaluation

In order to measure firm efficiency, this study applies DEA method which is a superior and more comprehensive performance measure than other traditional financial performance metrics (Baviera-Puig et al., 2020; Cooper et al., 2007). DEA collates each decision-making unit (DMU) to the "best" DMU that has efficiency equal to 1 and reach to the enveloped frontier. Therefore, each DMU will have its own efficiency score and is determined as follow:

$$TE_j = \frac{\sum_i S_i Y_{ij}}{\sum_m T_m X_{mj}} \leq 1, \ 1 \leq j \leq n, \tag{1}$$

where: TE_j: technical efficiency of firm j; S_i: weight of i-th output of y, hence, $0 \leq S_i \leq 1$; Y_{ij}: i-th output of j-th DMU; T_m: weight of m-th input of x, $0 \leq V_k \leq 1$; X_{mj}: m-th output of j-th DMU.

For a set of 277 DMUs with one output and two inputs, the authors analyse the same publicly-traded companies in Indonesia through time trend, and thus each firm efficiency is calculated using the constant returns to scale (CRS-DEA) (Charnes et al., 1978). Under an input orientation with a CRS-DEA, the inputs have a weighted sum of 1, and the j_0-th DMU can maximize its efficiency through maximizing its output by solving the following mathematical problem:

$$Max_{i,y} TE_{j0} \quad \text{or} \quad Max_{i,y} SY_{j0}$$

subject to:

$$\sum_m T_m X_{mj0} = 1, \ TE_j \leq 1, \ 1 \leq j \leq n. \tag{2}$$

In solving (2), DEAP 2.1 software was used to calculate the efficiency score in this study (Coelli, 1996). Escobar-Pérez et al. (2012) and Stuebs and Sun (2009b) suggested that indicators of cost and expenses of the operations should be considered as input variables in the DEA model to measure firm efficiency for an output variable related to firm performance, such as operating revenue, cash in balance, etc. As a consequence, to evaluate firm technical efficiency, this study includes two conventional input variables (cost of goods sold; selling, general, and administrative expenses) and one conventional output variable (revenue) in the DEA model.

2.2.2. Difference-in-differences tests and propensity score matching

The difference-in-differences method tracks mean change over time with comparisons between treatment and control subjects. Treatment subjects that are natural resource-based firms listed on the Indonesia Stock Exchange are required to direct planning, allocate the operational budget for CSR, and disclose relevant information in their annual reports; whereas, the controlling companies are excluded from the Government Regulation of Indonesia, and do not voluntarily disclose their plans and budgets for CSR in their reports. Furthermore, to ensure that the assignment to treatment is "random", the authors utilize PSM to define

the study sample to ensure that the control groups are as comparable as possible in terms of certain observable characteristics. First, the conditional probability of being identified as a treatment firm is estimated through Probit regression based on pre-treatment observed variables. Specifically, the authors match the regulations on firm size (natural logarithm of total assets), revenue (natural logarithm of net sales), and listing age (abbreviated as LAge).

The authors then match treatment firms to control firms using the nearest neighbour matching technique without replacement based on setting common support (Chen et al., 2018; Ioannou & Serafeim, 2017). We choose the nearest neighbour companies for each company based on the following model:

$$Treatment_i = \alpha_0 + \alpha_1 Revenue_i + \alpha_2 Size_i + \alpha_3 LAge_i + \varepsilon. \quad (3)$$

The Treatment takes on a value of 1 if company i is covered by the regulation; otherwise, the company gets a value of 0. After matching determination, an equilibrium test was run to examine whether control variables gain the higher balance in distribution regarding to apply PSM based on standardized mean difference (SMD). A balance was reached between the two groups in terms of the controlled characteristics in the Probit regression. The following Table 2 shows the PSM results.

Table 2. Equilibrium diagnosis for PSM sample (source: author's calculation)

Variables		Mean		% bias	% IbiasI decrease	*t*-test (*p*-value)
		Treatment	Control			
Revenue	Unmatched	21.40897	21.05532	17.835		0.0003
	Matched	21.40897	21.05938	17.676	0.89	0.0002
Size	Unmatched	21.8416	21.52673	17.471		0.0005
	Matched	21.8416	21.53407	17.128	1.96	0.0003
LAge	Unmatched	14.6087	15.30736	–8.479		0.0809
	Matched	14.6087	15.30363	–8.431	0.57	0.0847

Note: % bias is the SMD. % IbiasI reduced reflects a decrease of SMD after matching.

After performing PSM matching, to identify the impact of the disclosure regulation of CSR reporting, the authors estimate the following model with the DID approach. The regression model is presented as follows:

$$TE_{it} = \beta_0 + \beta_1 (Post) + \beta_2 (Treatment) + \beta_3 (Treatment \times Post) + \beta_j (Controls) + \varepsilon, \quad (4)$$

where: TE_{it}: technical efficiency of firm *i* in year *t*; *Post*: taking value of 1 if observation belongs to the post-period (i.e., 2013–2019), and 0 otherwise; *Treatment:* taking value of 1 if the listed firm is required to disclosure CSR by regulation and 0 otherwise; *Controls*: including some firm-level characteristics (firm size, ROA, listing age, industry dummy, year dummy).

The DID approach evaluates the difference in technical efficiency of firms in the sample based on two comparison combinations, which are a comparison before and after applying regulations of each group; compared between two groups.

3. Results

3.1. Descriptive statistics and correlation matrix

Table 3 reports the descriptive statistics for variables in the baseline regression (4), monitoring the difference in technical efficiency before and after regulation for listed companies in Indonesia. Technical efficiency (TE) has a sample mean of 0.374, i.e., the sample companies achieved a technical efficiency score of approximately 37.4% during the sampling period. The variables Treatment and Post have sample means of 0.166 and 0.635, respectively. The natural logarithm of total assets has a minimum value of 11,917 and a maximum value of 26,573, with an average value of 21,585; return on assets averaged 5.9% with a range from –169% to 134%. The firms have an average listing age of approximately 15 years, and 29 years as the oldest one.

Table 4 presents the pair-correlations between variables in the model. All six variables, i.e., Treatment, Post, the interaction variable Treatment*Post, firm size, ROA, and LAge, are significantly correlated with TE. In addition, the correlation between the variable Post and LAge is inversely related to TE. High correlations are also found between the independent and control variables. Treatment and post variables are significantly and positively correlated with listing age and firm size. Moreover, profitability expressed through ROA is inversely related to treatment and post variables. Therefore, to eliminate multicollinearity between the variables in the model, two separate regression models were carried out (see Table 5).

Table 3. Descriptive statistics – PSM sample (source: author's calculation)

Variables	Mean	Min	Max	Standard Deviation
TE	0.374	0.007	1	0.18
Treatment	0.166	0	1	0.372
Post	0.635	0	1	0.481
Treatment × Post	0.105	0	1	0.307
Size	21.585	11.917	26.573	1.742
ROA	0.059	–1.69	1.341	0.126
LAge	15.188	0	29	8.277

Table 4. Correlation matrix – PSM sample (source: author's calculation)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TE	1.000						
Treatment	0.188***	1.000					
Post	–0.082***	0.0006	1.000				
Treatment × Post	0.135***	0.77***	0.26***	1.000			
Size	0.225***	0.065***	0.181***	0.095***	1.000		
ROA	0.126***	–0.019	–0.133***	–0.073***	0.121***	1.000	
LAge	–0.042***	–0.031*	0.319***	0.059***	0.124***	0.019	1.000

Note: p-value <0.10 (*), p-value <0.05 (**), p-value <0.01 (***).

3.2. Empirical results

The regression technique to test the impact of mandatory CSR disclosure on firm efficiency will be performed by Tobit regression analysis. Since the TE score is limited from 0 to 1, the uncensored regression models can be biased while the Tobit regression is justified (Ngo, 2012a, 2012b; Samad, 2019). In Table 5, the Treatment coefficient was statistically significant at the 1% level which indicates that the treatment enterprises had a higher TE than the control condition in the pre-implementation period. Similarly, the coefficient of post at the 5% significance level shows that the control firms in the sample experience a change in technical efficiency after the mandatory disclosure of CSR. In terms of economic level, comparing with the control firms, the mandatory CSR disclosure results in an improvement in TE of the enterprises from 2.7% to 9.4%, which means mandatory CSR disclosure would affects and causes a positive change in firm efficiency. In addition, larger firm size and better profitability (ROA) can improve firm efficiency. Furthermore, the larger the listing age on the stock exchange is, the more the companies tend to reduce their operating efficiency, with a very small decrease of 0.18% in column 1 and 0.17% in column 2. This trend is a consequence of investors' expectations of uncertainty that newly-listed shares can bring higher performance for them (Hossain & Saif, 2019; Pástor & Pietro, 2003).

Table 5. The impact of mandatory CSR disclosure on firm technical efficiency (source: author's calculation)

Variables	Dependent variable: Technical efficiency	
	(1)	(2)
Treatment	0.099*** (0.014)	–
Post	–0.029** (0.016)	–
Treatment × Post	0.027* (0.016)	0.096*** (0.013)
Size	0.024*** (0.018)	0.023*** (0.002)
ROA	0.133*** (0.027)	0.130*** (0.027)
LAge	–0.0018** (0.0004)	–0. 0017*** (0.0004)
Industry dummy	Yes	Yes
Year dummy	Yes	Yes
Pseudo-R^2	–0.5402	–0.5131
p-value	0.0000	0.0000
N	3,042	3,042

Note: *p*-value <0.10 (*), *p*-value <0.05 (**), *p*-value <0.01 (***). Robust standard errors are in parentheses.

To assess the robustness of the results, an alternative sample was used for retest in which the criterion for selection the control firms was based on the treatment one firm size range. The results reported in column (1) of Table 6 show that the coefficient on Treatment*Post continues to be significantly positive. Finally, the main DID assumption is that without public policy, the trends of two observed comparison groups are similar over time; this assumption is realized as the parallel trend assumption (PTA). We perform a test to validate the PTA

for the pre-period from 2009 to 2011 as the pre-enactment year. Three additional variables were created, i.e., Year2009, Year2010, and Year2011. Next, we create interaction term between these variables and the treatment one, the insignificant results on Treatment*Year2009, Treatment*Year2010, and Treatment*Year2011 are showed in column (2) of Table 6. In the second test, we use the pseudo-event technique to test the PTA. Specifically, we designate 2010 as a pseudo enactment year to identify an analytical post period if the year falls into 2011 and 2012. Column (3) of Table 6 reports no change in firm technical efficiency subsequent to the pseudo enactment year. These results support the robustness and confirm the conformation of the PTA as well as prove hypotheses.

Table 6. Additional analysis for robustness checks (source: author's calculation)

Variables	Dependent variable: Technical efficiency		
	Matching treatment and control to the same firm size range (1)	Timing approach (2)	Pseudo enactment year being 2010, pre-period [2009, 2010], post-period [2011, 2012] (3)
Treatment	0.101*** (0.014)	0.097*** (0.027)	0.095*** (0.019)
Post	–0.03** (0.016)	–	–0.02 (0.015)
Year2009	–	0.012 (0.015)	–
Year2010	–	–0.147*** (0.012)	–
Year2011	–	0.018 (0.014)	–
Treatment × Post	0.026* (0.016)	–	0.014 (0.023)
Treatment × Year2009	–	0.035 (0.028)	–
Treatment × Year2010	–	–0.038 (0.028)	–
Treatment × Year2011	–	0.025 (0.034)	–
Size	0.025*** (0.018)	0.028*** (0.003)	0.028*** (0.003)
ROA	0.134*** (0.027)	0.14*** (0.044)	0.139*** (0.044)
LAge	–0.0018*** (0.0004)	–0.0027** (0.0007)	–0. 0027*** (0.0007)
Year dummy	Yes	–	Yes
Pseudo-R^2	–0.5509	–0.7567	–0.7477
p-value	0.000	0.000	0.000
N	3,024	1,108	1,108

Note: *p*-value <0.10 (*), *p*-value <0.05 (**), *p*-value <0.01 (***). Robust standard errors are in parentheses.

4. Discussion and implications

This study explores the impact of mandatory CSR disclosure on firm efficiency in Indonesia. The results prove that mandatory CSR disclosure produces a positive effect on firm performance in term of technical efficiency indicator. While previous studies on mandatory CSR disclosure have explored its impact on firm performance through indicators such as investment efficiency (Liu & Tian, 2021), return on assets and cash flow (Bhattacharyya & Rahman,

2019), firm profitability (Chen et al., 2018), and firm value and market performance (Garg & Gupta, 2020; Ioannou & Serafeim, 2017), this research extends the literature of the impact of CSR policy changes on firm performance by using a different evaluation criterion – firm technical efficiency. The firms' technical efficiency indicator reflects the process of using internal resources calculated through using DEA technique as a non-parametric method (Baviera-Puig et al., 2020). The study also provides empirical evidence on the monitoring role of mandatory CSR disclosure in an emerging economy that can be generalized to other developing/emerging ones that are considering the adoption of mandatory CSR regulations.

The findings based on exploring the impact of CSR regulation in Indonesia on firm technical efficiency offer several crucial implications for managers and policy-makers. Following the mandatory CSR regulation of some countries or stock exchanges, subjects of compulsory disclosure of CSR must be provided with clear standards, such as total assets, net revenues, and number of full-time employees; firms listed in the top ranking of stock exchanges, overseas-listed shares, financial firms; or all listed firms can make significant increases in firm performance as a result of CSR disclosure (Ioannou & Serafeim, 2017). While mandatory CSR regulation in Indonesia towards listed firms that use or are related to the natural resources and give an increase in firm technical efficiency. Therefore, in order to further extend the impact of mandatory CSR regulation, Indonesian legislators may consider expanding the applicable objects of regulation. This implication also assists to overcome the issue of discrimination in the compulsory CSR regulation of Indonesia, in which focus is directed only on a target group that can have a direct impact on the environment without taking into accounted objects that can cause indirect effects on the environment (Waagstein, 2011). Moreover, this implementation regulation does not provide substantial details about what a company should do and how it should fulfil the CSR requirement; there is also no provision for CSR supervision. Indeed, especially in a country as ethnically, religiously, and socially diverse as Indonesia, this could defeat the main purpose of CSR regulation, i.e., to benefit society and the environment, because companies may then perform any type of non-directed CSR at their own expense. Furthermore, a company may use fraudulent CSR schemes to manipulate public opinion or indirectly bribe those in power. To achieve effective mandatory CSR, on the one hand, the regulation should specify which CSR activities are mandatory, an official list of approved CSR activities or requirements to obtain governmental approval, and precisely how a company must perform such activities and fulfil such requirements. On the other hand, provisions for controlling and evaluating CSR implementation, as well stipulations of sanctions for non-compliance, are critical to encourage companies to do everything in their power to avoid such sanctions. The suggestions expand the implications of mandatory CSR disclosure, and will be of substantial value to governmental authorities in other developing countries.

Listed firms related to natural resource in Indonesia implement CSR due to the mandatory regulations No. 47 of 2012 with the majority goal is to regulate resource allocation (Eriandani & Winarno, 2021). CSR practices in order to gain social legitimacy refers to comply regulation is sometimes viewed as symbolic actions, causing no impact on stakeholders' perception and business performance. Meanwhile, if CSR is implemented directly toward high-proximity stakeholders as substantive CSR actions, the result is significant (Schons &

Steinmeier, 2016). Disclosure of CSR in compliance with Government Regulations not only creates a legal basis for business to be granted access to natural resources that are assumed to be in common ownership of society as in Indonesia, but also enhances firms' technical efficiency. Consequently, managers should also utilize this regulation as an effective tool to develop and manage the companies' annual plan, and improve firm performance following technical efficiency indicator.

Conclusions

This paper examines and proves the impact of mandatory CSR disclosure on firm efficiency in an emerging market. The compulsory CSR disclosure regulation in Indonesia stems from the environmental pollution of companies that use or are related to natural resources; the scope of influence of the regulation only covers natural resource-based firms. Therefore, it raises a concern whether mandatory CSR disclosure can give greater effect on technical efficiency of firms subject to the mandate than their counterparts. Difference-in-differences results shown that subsequent to the mandatory CSR disclosure regulation, treatment firms achieve a positive change in technical efficiency in comparison with control firms.

Some limitations exist in this study. The data were collected only in Indonesia over eleven years, and thus generalization of the results should be cautiously applied. Future research can add a number of countries with mandatory CSR disclosure regulations for comparison. The study also used a firm technical efficiency indicator to measure firm performance, which could produce different results compared with stakeholder-reviewed results, a stakeholder theory-based approach. An additional quantitative and qualitative research could be applied which directly assesses stakeholder perception of mandated CSR laws, such as managers, staff, local community members, etc. In addition, since mandatory CSR disclosure could be perceived as a shock for companies, future researches should use event study to further elucidate its impacts.

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References

Andrini, L. (2016). Mandatory corporate social responsibility in Indonesia. *Mimbar Hukum – Fakultas Hukum Universitas Gadjah Mada*, *28*(3), 512–525. https://doi.org/10.22146/jmh.16669

Baviera-Puig, A., Baviera, T., Buitrago-Vera, J., & Escribá-Pérez, C. (2020). Internal benchmarking in retailing with DEA and GIS: The case of a loyalty-oriented supermarket chain. *Journal of Business Economics and Management*, *21*(4), 1035–1057. https://doi.org/10.3846/jbem.2020.12393

Bhattacharyya, A., & Rahman, M. L. (2019). Mandatory CSR expenditure and firm performance. *Journal of Contemporary Accounting Economics*, *15*(3), 100163. https://doi.org/10.1016/j.jcae.2019.100163

Brammer, S., & Millington, A. (2008). Does it pay to be different? An analysis of the relationship between corporate social and financial performance. *Strategic Management Journal*, *29*(12), 1325–1343. https://doi.org/10.1002/smj.714

Carson, T. (1993). Friedman's theory of corporate social responsibility. *Business and Professional Ethics Journal*, *12*(1), 3–32. https://doi.org/10.5840/bpej199312118

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, *2*(6), 429–444. https://doi.org/10.1016/0377-2217(78)90138-8

Chen, Y. C., Hung, M., & Wang, Y. (2018). The effect of mandatory CSR disclosure on firm profitability and social externalities: Evidence from China. *Journal of Accounting Economics*, *65*(1), 169–190. https://doi.org/10.1016/j.jacceco.2017.11.009

Coelli, T. J. (1996). *A guide to FRONTIER version 4.1: A computer program for stochastic frontier production and cost function estimation* (CEPA Working papers No. 7/96).

Cooper, W. W., Seiford, L. M., & Tone, K. (2007). *Data envelopment analysis: A comprehensive text with models, applications, references and DEA-solver software* (Vol. 2). Springer. https://doi.org/10.1007/978-0-387-45283-8

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835–2857. https://doi.org/10.1287/mnsc.2014.1984

Eriandani, R., & Winarno, W. A. (2021). Corporate social activities and adjusted firm performance: An SOE's context. *Indian Journal of Economics Business and Professional Ethics Journal*, *20*(2), 329–339. https://zenodo.org/record/5409509#.YYC6P55BziA

Escobar-Pérez, B., Lobo-Gallardo, A., & Otero-Terrón, J. I. (2012). A DEA model for measuring efficiency adapted to the hotel sector. *Enlightening Tourism. A Pathmaking Journal*, *2*(1), 44–65.

European Commission. (2011). *Communication from the Commision to the European Parliament, the Council, the European Ecnomic and Social Committee and the Committee of the Regions – A renewed EU strategy 2011-14 for Corporate Social Responsbility.* Brussels, Belgium. https://www.europarl.europa.eu/meetdocs/2009_2014/documents/com/com_com(2011)0681_/com_com(2011)0681_en.pdf

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A*, *120*(3), 253–281. https://doi.org/10.2307/2343100

Freeman, R. E. (2010). *Strategic management: A stakeholder approach*. Cambridge University Press. https://doi.org/10.1017/CBO9781139192675

Friedman, M. (2007). The social responsibility of business is to increase its profits. In W. C. Zimmerli, M. Holzinger, & K. Richter (Eds.), *Corporate ethics and corporate governance* (pp. 173–178). Springer. https://doi.org/10.1007/978-3-540-70818-6_14

Garg, A., & Gupta, P. K. (2020). Mandatory CSR expenditure and firm performance: Evidence from India. *South Asian Journal of Business Studies*, *9*(2), 235–249. https://doi.org/10.1108/SAJBS-06-2019-0114

Guthrie, J., & Parker, L. D. (1989). Corporate social reporting: A rebuttal of legitimacy theory. *Accounting and Business Research*, *19*(76), 343–352. https://doi.org/10.1080/00014788.1989.9728863

Hossain, M. S., & Saif, A. N. M. (2019). Impact of firm size on financial performance of banking companies in Bangladesh. *Journal of Banking & Financial Services*, *11*(2), 143–160.

Ioannou, I., & Serafeim, G. (2017). *The consequences of mandatory corporate sustainability reporting* (Harvard Business School research working paper No. 11–100).

Jensen, M. C. (2010). Value maximization, stakeholder theory, and the corporate objective function. *Journal of Applied Corporate Finance*, *22*(1), 32–42. https://doi.org/10.1111/j.1745-6622.2010.00259.x

Jones, T. M. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *Academy of Management Review*, *20(2)*, 404-437. https://doi.org/10.2307/258852

Law of the Republic of Indonesia. (2007). *Indonesia Company Act No.40/2007 on Limited Liability Companies, No. 40/2007 C.F.R.*

Law of the Republic of Indonesia. (2012). *Indonesia Government Regulation No.47/2012 on Corporate Social and Environmental Responsibility, No. 47/2012 C.F.R.*

Lin, C. P., Chen, M. H., Wang, J., & Tian, L. (2016). Corporate giving in Taiwan: Agency cost theory vs. value enhancement theory. *Asia Pacific Business Review*, *23*(1), 135–151. https://doi.org/10.1080/13602381.2016.1149376

Liu, L., & Tian, G. G. (2021). Mandatory CSR disclosure, monitoring and investment efficiency: Evidence from China. *Accounting & Finance*, *61*(1), 595–644. https://doi.org/10.1111/acfi.12588

McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review*, *26*(1), 117–127. https://doi.org/10.5465/amr.2001.4011987

Mohamed, T., Olfa, B. J., & Faouzi, J. (2014). Corporate social disclosure: Explanatory theories and conceptual framework. *International Journal of Academic Research in Management*, *3*(2), 208–225.

Ngo, T. (2010). *Evaluating the efficiency of Vietnamese banking system: An application using Data Envelopment Analysis*. SSRN. https://doi.org/10.2139/ssrn.1626009

Ngo, T. (2012a). Measuring the performance of the banking system: Case of Vietnam (1990–2010). *Journal of Applied Finance & Banking*, *2*(2), 289–312.

Ngo, T. (2012b). *The performance of Vietnamese banking system under financial liberalization: Measurement using DEA*. SSRN. https://doi.org/10.2139/ssrn.2136150

O'Sullivan, A., & Sheffrin, S. M. (2003). *Economics: Principles in action.* Pearson Prentice Hall.

Owen, D. (2008). Chronicles of wasted time? A personal reflection on the current state of, and future prospects for, social and environmental accounting research. *Accounting, Auditing Accountability Journal*, *21*(2), 240–267. https://doi.org/10.1108/09513570810854428

Pástor, Ľ., & Pietro, V. (2003). Stock valuation and learning about profitability. *The Journal of Finance*, *58*(5), 1749–1789. https://doi.org/10.1111/1540-6261.00587

Phillips, R., Freeman, R. E., & Wicks, A. C. (2003). What stakeholder theory is not. *Business Ethics Quarterly*, *13*(4), 479–502. https://doi.org/10.5840/beq200313434

Rahim, I. (2021). Environmental disclosure and firm efficiency: A study of Pakistani firms. *Asian Review of Accounting*, *29*(3), 269–290. https://doi.org/10.1108/ARA-05-2019-0100

Rinawiyanti, E. D., Huang, X., & As-Saber, S. (2020). Adopting management control systems through CSR strategic integration and investigating its impact on company performance: Evidence from Indonesia. *Corporate Governance: The International Journal of Business in Society*. https://doi.org/10.1108/CG-04-2020-0150

Rodriguez-Fernandez, M. (2016). Social responsibility and financial performance: The role of good corporate governance. *Business Research Quarterly*, *19*(2), 137–151. https://doi.org/10.1016/j.brq.2015.08.001

Rosser, A., & Edwin, D. (2010). The politics of corporate social responsibility in Indonesia. *The Pacific Review*, *23*(1), 1–22. https://doi.org/10.1080/09512740903398314

Samad, A. (2019). Determinants of Efficiency of the Islamic Banks of Bangladesh during 2008–2012. *Journal of Islamic Banking and Finance*, *7*(1), 1–13. https://doi.org/10.15640/jibf.v7n1a1

Schons, L., & Steinmeier, M. (2016). Walk the talk? How symbolic and substantive CSR actions affect firm performance depending on stakeholder proximity. *Corporate Social Responsibility and Environmental Management*, *23*(6), 358–372. https://doi.org/10.1002/csr.1381

Shaikh, I. (2022). Environmental, social, and governance (ESG) practice and firm performance: An international evidence. *Journal of Business Economics and Management*, *23*(1), 218–237. https://doi.org/10.3846/jbem.2022.16202

Shiu, Y. M., & Yang, S. L. (2017). Does engagement in corporate social responsibility provide strategic insurance-like effects? *Strategic Management Journal*, *38*(2), 455–470. https://doi.org/10.1002/smj.2494

Stuebs, M., & Sun, L. (2009a). Corporate reputation and technical efficiency: Evidence from the chemical and business services industries. *Journal of Applied Business Research*, *25*(5), 21–30. https://doi.org/10.19030/jabr.v25i5.1003

Stuebs, M., & Sun, L. (2009b). *Social responsibility and firm efficiency in the business services industry*. SSRN. https://doi.org/10.2139/ssrn.1435032

Su, R., Liu, C., & Teng, W. (2020). The heterogeneous effects of CSR dimensions on financial performance – a new approach for CSR measurement. *Journal of Business Economics and Management*, *21*(4), 987–1009. https://doi.org/10.3846/jbem.2020.12394

Usunier, J. C., Furrer, O., & Furrer-Perrinjaquet, A. (2011). The perceived trade-off between corporate social and economic responsibility. *International Journal of Cross Cultural Management*, *11*(3), 279–302. http://doi.org/10.1177/1470595811413102

Vilanova, M., Lozano, J. M., & Arenas, D. (2009). Exploring the nature of the relationship between CSR and competitiveness. *Journal of Business Ethics*, *87*(1), 57–69. https://doi.org/10.1007/s10551-008-9812-2

Waagstein, P. R. (2011). The mandatory corporate social responsibility in Indonesia: Problems and implications. *Journal of Business Ethics*, *98*(3), 455–466. https://doi.org/10.1007/s10551-010-0587-x

Wang, K. T., & Li, D. (2016). Market reactions to the first-time disclosure of corporate social responsibility reports: Evidence from China. *Journal of Business Ethics*, *138*(4), 661–682. https://doi.org/10.1007/s10551-015-2775-1

Weber, M. (2008). The business case for corporate social responsibility: A company-level measurement approach for CSR. *European Management Journal*, *26*(4), 247–261. https://doi.org/10.1016/j.emj.2008.01.006

Zainal, R. I. (2020). Stakeholders perception on mandated CSR laws in Indonesia. In *Proceedings of the 3rd Global Conference on Business, Management, and Entrepreneurship (GCBME 2018)*. Atlantis Press. https://doi.org/10.2991/aebmr.k.200131.046