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Water disclosure in the agriculture industry: Does stakeholder influence matter?☆,☆☆

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ABSTRACT

This study presents an analysis of stakeholder influence on water-related disclosure in the most water-sensitive industry, namely, agriculture. The availability of clean water is currently under pressure, and stakeholders are starting to pay attention to a company's water responsibilities. The influence of stakeholders is analyzed using the lens of ethical or normative stakeholder theory. The sample includes 195 agriculture companies registered in the OSIRIS database from 2017-2019. The data were collected from the database, company reports, and other company official media on the internet. Following the Hausman test procedure, the data were analyzed using random effect model. Governments, foreign shareholders, and international operations were found to be significant drivers of water disclosure practices. However, the creditor power hypothesis was rejected, as it had an insignificant influence. This paper contributes to the literature by providing empirical evidence of stakeholder influence on water disclosure in the agriculture industry, which has not been previously investigated.

1. Introduction

Water is a natural resource that is essential to human life and other creatures living on Earth (Zhang et al., 2020). Water is considered a basic need for life but is often poorly understood and protected compared to other natural resources (Fogel and Palmer, 2014). Water is not only an important resource for humans but also for companies that are dependent on water (Christ, 2014; Martinez, 2015). According to the OECD (2012), water consumption in global industry is expected to increase significantly by 2050, which will decrease the water quantity on

☆ To maintain a good relationship with stakeholders, companies need to acknowledge the perception of each stakeholder related to the impact of business operations that affect them. This encourages companies to identify stakeholder power and understand the interests of each group of stakeholders. This wide scope of stakeholders results in a high variation in stakeholder demands, which means that different stakeholders have different purposes and information needs (Gunawan, 2010). Stakeholders press companies to be transparent by disclosing information regarding responsible activities (Hammami and Zadeh, 2020). Stakeholders then give a positive reaction if company performances and disclosures meet their expectations. On the other hand, negative reactions will occur when companies fail to fulfill stakeholder demands for performance and disclosure (Beyer et al., 2010). Disclosure is considered an effective medium to communicate company values and policies related to sustainability (Saha, 2019). Disclosure can be deemed a strategy to fulfill the various demands of stakeholders, including foreign stakeholders located in different geographic locations (Cai et al., 2019; Sari et al., 2021). In addition, disclosure can be used to equate a company's value with stakeholder value to maintain legitimacy (Suchman, 1995; Deegan, 2002; Eugenio et al., 2013).☆☆ As there is increasing concern and pressure from stakeholders for water responsibility in water-sensitive industries, it is important to investigate the influence of stakeholders on water disclosure practices in the agriculture industry. By reviewing the literature in water disclosure, it appears that previous studies investigated water disclosure practices in all industries regardless its sensitivity to water. Interestingly, the studies found that water sensitive industry disclose more information related to water (Burritt et al., 2016; Yu et al., 2020). Zhang et al. (2021) revealed industry that consume higher amount of water provide higher level of water disclosure. Yu (2021) reported that water sensitive industry is positively and significantly related to the disclosure of water resources information. From these findings, it can be assumed that water sensitive industry receives more pressure from stakeholder so that water disclosure is produced. However, there is no research examining the relationship between stakeholder pressure and water disclosure practices in water sensitive industry especially agriculture which is the biggest water consumer. Therefore, this research complements previous research by investigating the influence of various types of stakeholders on water disclosure practices in the agriculture industry. This paper considers the following research question.

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earth. South Africa provides an example, in which 62% of available water is used by the agriculture industry (Askham, 2019). The agriculture industry also dominates water use in Europe by consuming 40% of the total water, an amount greater than other industries (European Environment Agency, 2018).

Burritt et al. (2016) argued that water-sensitive companies suffer considerable pressure to maintain access to water in terms of both quantity and quality. Since the issue of water scarcity has emerged, the agriculture industry has received much attention and is expected to take an active role in preserving water availability (Talukder et al., 2020; Valizadeh and Hayati, 2021). As companies use a large amount of water and contribute to the water crisis, stakeholders will start to influence companies to take action and be responsible for the negative impacts of water usage. The agriculture industry should play an active role in protecting and preventing water scarcity due to its activities. Managers are also under pressure to demonstrate the effectiveness and efficiency of water usage to reduce water shortages. Companies are expected to use water wisely; if not, they may lose legitimacy from stakeholders who have access to water (Burritt et al., 2016). Hence, water responsibility should be included in corporate social responsibility (CSR) programs to ensure that their operation does not have a significant impact on water (Lodhia and Hess, 2014; Zhou et al., 2018). Corporate water disclosure is necessary to communicate actions regarding water management and responsibility to stakeholders (Hazelton, 2013).

RQ. What type of stakeholders significantly influence water-related disclosure?

To answer this question, this paper examines various groups of stakeholder to understand their relationship to water disclosure practices. It includes government, foreign shareholder, creditor, and international stakeholder because these groups engage more often in corporate decision processes such as disclosure practices. This study investigates the extent of water disclosure in annual and/or sustainability report of 195 listed agriculture companies in the world during the period 2017–2019. In terms of research contribution, this research contributes to the social and environmental accounting literature in the area of corporate water disclosure by offering at least two major contributions. First, this study examines stakeholder pressure on water disclosure, as there is a lack of studies discussing this topic. Research on sustainability disclosure is dominated by investigations of the overall aspect of CSR (Arena et al., 2018). On the other hand, the number of water disclosure articles published in scientific journals is relatively low. Second, this study examines all listed agriculture companies in the world to present the evidence regarding stakeholder pressure on water disclosure from the most water-sensitive industries. There is no previous research investigating the effect of stakeholders on water disclosure practices in the agriculture industry.

The remainder of the paper is arranged as follows. Section 2 provides a literature review and theoretical background used to examine the hypotheses drawing on the normative branch of stakeholder theory. Section 3 discusses the method used, and Section 4 provides the data analysis and results. Section 5 then presents the implications of this research. Section 6 concludes the paper.

2. Literature review and theoretical background

CSR and disclosure have received much attention from researchers to discover influential factors of corporate social and environmental disclosure (Cahaya et al., 2017; Sari et al., 2021; Nyahas et al., 2018). However, research examining water disclosure practices is relatively limited. Burritt et al. (2016) analyzed the relationship of stakeholder pressure to water disclosure from 100 companies in Japan. Their study used company characteristics as a proxy for stakeholders. This study found that ownership concentration, firm size, and water sensitivity are significant drivers of water disclosure. Yu et al. (2020) investigated the determinants of the water-related disclosure of 347 US firms. Similar to Burritt et al. (2016), this research dominantly examined corporate characteristics and their relationships to disclosure. This study found that leverage, blockholder ownership, famous indexed firms, and water sensitivity significantly influenced US company disclosures of water information.

These two water disclosure papers served as drivers of water disclosure. They did not explicitly investigate the effect of stakeholders on water disclosure, although stakeholder theory was used as the theoretical background. Stakeholder theory holds that managers need to satisfy stakeholder demand, including requests for information on corporate water responsibility. In terms of disclosure practices, companies produce corporate disclosures because managers receive pressure from stakeholders. However, these previous studies discussed the effect of corporate characteristics more than stakeholder influence on water disclosure practices. Therefore, there is room to explore other potential variables on water disclosure associated with stakeholder pressure.

On the other hand, Zhang et al. (2021) and Yu (2021) provided evidence that the water-sensitive industries tend to disclose more water responsibilities. This means that a water-sensitive industry may receive extra attention to maintain water availability, as this industry uses much water. Then, this industry presents water-related information to show its commitment to preserving the water. It is therefore important to examine the effect of stakeholders on water disclosure in water-sensitive industries. The agriculture industry is considered the most water-sensitive industry because of its high water usage. However, there is no research investigating the effect of stakeholders on water disclosure in the agriculture industry. Non-accounting literature has paid attention to water management and sustainability in the agriculture industry. Water quality is the basic sustainability indicator that should be achieved by agriculture (Valizadeh and Hayati, 2021; Yazdanpanah et al., 2014). The main focus of sustainable development in agriculture is to maintain the availability of natural resources such as water (Laurett et al., 2021). Talukder et al. (2020) explained that the achievement of agricultural resilience and sustainability depends on stakeholder perspectives and policies and will be achieved when companies engage with them.

2.1. Stakeholder theory

Stakeholder theory holds that companies need to create a good relationship with stakeholders by meeting their demands and treating them in the best manner. The organization's management is expected to take on activities that are expected by stakeholders and report those activities to stakeholders. Clarkson (1995) categorized stakeholders into two groups based on their interests, claims, or rights, namely, primary and secondary stakeholders. Primary stakeholders are deemed key stakeholders on whom the company depends, meaning the company cannot survive without them. Secondary stakeholders are defined as groups that influence and are influenced by the company but are not engaged in transactions, and their power is not essential for its survival. The debates are raised among scholars when questioning whether companies need to treat all stakeholders equally to fulfill moral obligations or focus only on stakeholders with high power and influence who are decisive for their survival (Nyahas et al., 2018). These debates have led to the division of stakeholder theory into two branches, namely, normative or ethical and managerial or positive branch stakeholder theory.

In the normative (ethical) branch, stakeholders have the right to be treated fairly by the company as an ethical responsibility for the maximum benefit of both the company and its stakeholders. All stakeholders have the right to be provided with information about how the company impacts them, even if they choose not to use it (Guthrie et al., 2004). The positive branch of stakeholder theory explains that it is practically impossible for managers to satisfy all stakeholder demands. Thus, managers decide to pay attention to a limited group of stakeholders who have control over corporate resources. The use of a positive

branch is relevant when a company is unable to provide all the information needed by all stakeholders. Managers need to select a group of important stakeholders so that corporate disclosure is addressed to fulfill their interests (Ullmann, 1985). Mitchell et al. (1997) provided a technique for stakeholder identification based on three attributes: power, legitimacy, and urgency.

Stakeholder theory has been largely adopted by scholars to explain the effects of stakeholders on disclosure practices. Although there is no research that explains this, Burritt et al. (2016) argued that the academic literature supports a positive or managerial branch for managing relationships with stakeholders. This research adopts the normative or ethical branch of stakeholder theory because it is considered appropriate to explain the influence of a broad scope of stakeholders on water disclosure. Water is essential for people's lives, so all types of stakeholders will try to influence companies to be responsible for their negative impact on water availability.

This paper considers four variables representing the types of stakeholders, namely, government ownership, foreign ownership, creditor power, and international operation. Government and foreign ownership represents shareholders who are known to play active roles in influencing managers in the decision-making process, including CSR practices and disclosures (Habbash, 2016). Creditor power represents pressure from creditors to companies to make water disclosures to estimate corporate risk from a nonfinancial perspective. International operation represents stakeholders from other countries when companies operate internationally. Each of these variables will be discussed in detail below.

2.1.1. Government ownership

The government is a powerful stakeholder that can strongly influence disclosure practice by enacting regulations where these rules must be obeyed (Alfraih and Almutawa, 2017). Furthermore, the existence of government in a company's ownership structure will strengthen its power because the government can directly influence managers to conduct particular responsibility performance, including water performance and disclosure. The government can easily drive companies to comply with regulations. Government-owned companies are under public scrutiny because their activities are more visible in front of the public eye, and there are higher expectations from them to be concerned about public welfare (Sari et al., 2021). Habbash (2016) found that the number of shares owned by the government generated pressure on companies where disclosures were made to address this pressure. In contrast, companies with government ownership receive less pressure to disclose information because the government is too dominant in capital structures, which easily drives companies to make disclosures (Alnabsha et al., 2018). This study expects that there is a relationship between government ownership and water disclosure because of the duty of the government to consider people's welfare.

H1. There is a positive relationship between government ownership and the extent of water disclosure in agriculture companies.

2.1.2. Foreign ownership

Foreign ownership reflects the influence of foreign individuals or organizations that are separated by geographical distance between a company and its shareholders (Ismail et al., 2018). A study by Hu et al. (2018) found that a higher level of foreign ownership indicates a higher influence of a company to perform certain activities, including disclosure. According to Sari et al. (2021), foreign shareholders tend to demand high-level corporate disclosures because they are geographically separated. The higher demand for information from foreign shareholders is reasonable to reduce information asymmetry between companies and foreign shareholders (Adel et al., 2019). Furthermore, a high level of disclosure is considered important to foreign stakeholders to monitor the company, predict future prospects, and decrease the cost of obtaining information (Cai et al., 2019). Dyck et al. (2019) argued that foreign shareholders usually transfer their value of accountability and transparency to companies where their resources are invested. Ismail et al. (2018) found that foreign ownership had a positive and significant influence on environmental disclosure. Similar to Ismail et al. (2018), Cahaya et al. (2017) provided evidence that there is a strong influence from foreign ownership on social disclosure. This study therefore assumes that companies with foreign ownership will tend to be influenced and pressed to present water-related disclosures.

H2. There is a positive relationship between foreign ownership and the extent of water disclosure in agriculture companies.

2.1.3. Creditor power

Creditors, as providers of capital loans, are deemed strong stakeholders who can influence corporate performance and disclosure (Lu and Abeysekera, 2014). Companies that highly rely on debt financing receive a higher degree of influence from creditors so that companies are expected to respond to creditors' expectations regarding the firm's role in responsible performance. A creditor not only assesses corporate financial performance but also measures corporate survival from nonfinancial aspects, such as water responsibility, once the company is considered sensitive to water and contributes to water scarcity. It can be said that a company's legitimization is under public scrutiny and will be revoked when the company fails to be responsible for the environment, including water (Fahad and KB, 2020). Creditors therefore begin to play their roles in pressing companies to disclose information related to responsibility activities. In terms of disclosure in water-sensitive companies, creditors may need information about water responsibility to assess corporate risk and legitimacy (Yu et al., 2020). Scholars have found that creditors do not have a significant effect on disclosure (Rahman et al., 2011; Giannarakis, 2014). On the other hand, other studies have discovered a significant effect of creditor influence on disclosure (Chang, 2013; Muttakin and Khan, 2014; Sulaiman et al., 2014).

H3. There is a positive relationship between creditors and the extent of water disclosure in agriculture companies.

2.1.4. International operation

Companies often decide to expand their business into other countries to raise market share and maximize profit. On the other hand, such expansion also increases the number of stakeholders who live in those countries where the company now operates internationally. Companies have to take into account the expectation of foreign stakeholders to be responsible while companies exploit their water sources. This means that there is another source of pressure, and influence should be recognized by companies to perform responsibility activities. Companies need to ensure that their values are in line with the values and culture of the countries where the company runs the business abroad (Garcia--Sanchez et al., 2016; Smith et al., 2010). Countries with a high culture and value in sustainability, such as developed countries, tend to actively scrutinize companies' performances and try to influence firms to promote sustainability activities. Sun et al. (2019) provided the suggestion that companies are expected to be concerned about sustainability issues when they operate in countries with strict regulations. Cahaya et al. (2017) found a positive and significant association between international operation and corporate disclosure practice.

H4. There is a positive relationship between international operations and the extent of water disclosure in agriculture companies.

To enhance the understanding, this study provides analytical diagram procedure depicted in Fig. 1. This research is conducted based on the fact that agriculture is an industry that use larger amount of water compared to other industries. Since the water scarcity issues are emerged, water conservation is expected to be the main priority in CSR activities in order to maintain water availability. On the other hand, there is the demand from stakeholder that agriculture company is to be

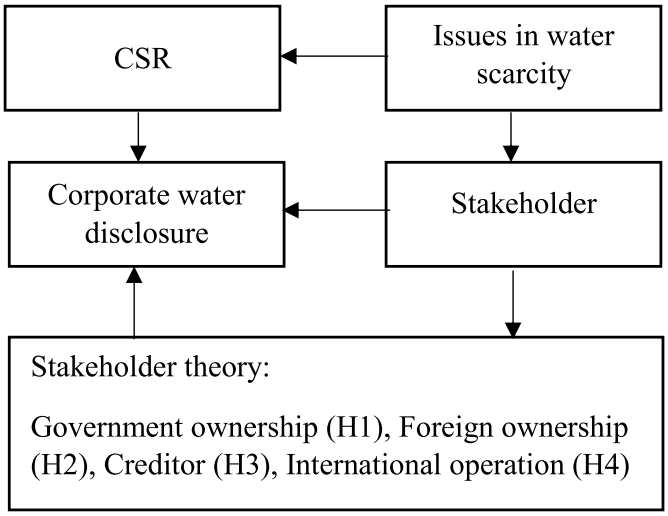

Fig. 1. Analytical procedure diagram.

responsible for its negative impact in association with water. In addition, stakeholder requests company to provide information about corporate impact on water and the activity to diminish the negative impact. Company, hence, produces water disclosure to satisfy stakeholder demand and shows the public that company is accountable and transparent. To present empirical evidence of the relationship between stakeholder and water disclosure practices, this study adopts stakeholder theory. This theory describes that management is expected to take on activities which is expected by stakeholder. Therefore, this paper investigates the effect of government ownership, foreign ownership, creditor, and international operation on water disclosure practices in agriculture companies across the world.

3. Research method

3.1. Sample and data

This paper used all agriculture companies that were available in the OSIRIS database. The listed agriculture companies were only selected as research samples for two reasons. First, listed companies received considerable interest from key stakeholders such as investors and governments. Second, listed companies were more regulated than unlisted companies in terms of CSR disclosure practices. There were 195 listed agriculture companies around the globe that were appropriate as research samples (see Table 1). This study covered the 2017–2019 period as examination years. This is because stakeholder attention to sustainability increased after the Sustainable Development Goals (SDGs) were released by the United Nations (UN) in 2015. Then, it can be argued that all stakeholders began to use their power to influence companies to take action toward sustainability, such as water conservation. This research used unbalanced data that allowed uncompleted data from companies involved in the analysis processes. To empirically test stakeholder influence on water disclosure in the agriculture industry, this study developed the following research model:

$$WDI = \beta_0 + \beta_1 GOVOWN + \beta_2 FOROWN + \beta_3 CRDPRS + \beta_4 INTOP + \beta_5 NATIDX + \beta_6 SIZE + \beta_7 ROA + \beta_8 AGE + \varepsilon$$

3.2. Measurement

3.2.1. Dependent variable

Water disclosure is used in this study as the dependent variable. To gather the data, a content analysis technique was applied to measure the dependent variable. This research used this technique to quantify qualitative data collected from companies' annual and/or sustainability reports (Zaid et al., 2020). Then, the water disclosure index was constructed based on the water disclosure indicators provided by Morikawa et al. (2007). Morikawa et al. (2007) presented 24 water disclosure indicators covering quantitative and qualitative indicators that guide companies to achieve a water-sustainable firm. A list of the 24 water parameters is presented in Appendix 1. Previous research from Burritt et al. (2016) adopted these indicators to measure water disclosure practices from Japanese companies. Following the previous study, this paper employed these indicators to measure agriculture companies' water disclosure practices.

In terms of index construction processes, each company's report was read carefully to ensure that water-related information was not missed. Then, the checklist technique was applied and gave a value of 1 if an item of water responsibilities was reported and a value of 0 if it was not disclosed. A total of these scores was used as a water disclosure index with a value between 0 and 24 for each company. This study also evaluated the reliability and internal consistency of the water disclosure items included in the checklist. Cronbach's alpha is considered a popular and adequate test of internal consistency reliability. According to Sekaran and Bougie (2016), a coefficient value of $\alpha = 0.7$ or higher is considered reliable. Cronbach's alpha coefficient for the water disclosure indicators was 0.763. This suggested that the set of items in the water disclosure index captured the same underlying construct.

Table 1
Sample distribution.

Country	Number of Firm(s)	Country	Number of Firm(s)
Continent: Asia			
Saudi Arabia	2	Japan	1
Bangladesh	1	Malaysia	3
China	106	Mongolia	4
India	14	Singapore	2
Indonesia	4	Sri Lanka	2
Iraq	1	Uzbekistan	3
Iran	5	Vietnam	3
Continent: Europe			
Bosnia Herzegovina	2	Denmark	1
United Kingdom	3	Ireland	1
Germany	2	Cayman Islands	1
Croatia	2	Lithuania	1
Poland	1	Romania	3
Cyprus	1	Ukraine	1
Continent: North and South America			
USA	3	Brazil	1
Chile	1	Ecuador	7
Jamaica	1	Canada	1
Continent: Africa and Oceania			
Australia	3	Kenya	1
Egypt	2	Ivory Coast	1
New Zealand	3	Zimbabwe	1
TOTAL:	**195**		

3.2.2. Independent variables

Government ownership. This variable represents the influence from government to company on disclosing water-related responsibility information. In previous research, government ownership was evaluated by a dummy variable for categorizing the sample into two groups of companies: government- and nongovernment-owned companies (Sari et al., 2021). However, this measurement technique does not capture government influence when it has larger or lesser ownership. In line with previous studies, such as Ismail et al. (2018), this study therefore measures government ownership using the percentage of shares owned by the government.

Foreign ownership. This variable is operationalized as the influence of

foreign shareholders on companies being accountable and transparent by disclosing water information. This study defines foreign ownership as a person or group from overseas that is part of the company's ownership structure. Unlike previous studies that recognized this variable as a categorical variable (e.g., Fahad and KB, 2020), foreign ownership in this study is measured by adding up the shares owned by foreign investors.

Creditor power. This variable represents the power of creditors to influence corporate water disclosure practices. Previous studies use leverage as a representation of creditors to analyze their effect on companies' decisions and performances. However, there are many equations for obtaining leverage scores that differ among studies. Lu and Abeysekera (2014) determined the leverage score by calculating total debt divided by total assets, while Fahad and KB (2020) generated leverage from total assets divided by total equity. This study measures creditor power using the leverage ratio from Roberts (1992) by calculating total debt divided by total equity.

International operation. This variable represents the influence of foreign stakeholders, who live in countries where companies operate internationally, on water disclosure. Following Sari et al. (2021), international operation is defined as the company having foreign sales or overseas subsidiaries or abroad branch offices. This variable is considered a categorical variable and is measured using dichotomous codes, with the value of "1" if the company runs the business overseas and "0" otherwise.

3.2.3. Control variables

Although there is no empirical evidence yet, water-related disclosures may depend on the level of water availability in a country. A lower level of water may result in higher attention from the public to ensure water sustainability. On the other hand, it can be assumed that there is lower public scrutiny of the water in countries with abundant water sources. This research estimated that the level of water in a country may be used by stakeholders to justify their influence on companies to conduct water responsibility activities and disclosures. Therefore, this study employed the level of water availability in a country (NATIDX) as a control variable, which was measured using the capital natural index score provided by SolAbility. This study also used firm size (SIZE), as it was expected that a larger company would disclose more CSR information (Qa'dan and Suwaidan, 2019). Firm size was measured by the natural logarithm of total assets. Then, firm profitability and firm age were included in the research model. Return on assets (ROA) and number of years since inception (AGE) were used to measure firm profitability and age, respectively (Hu et al., 2018; Muttakin and Subramaniam, 2015) (see Table 2).

4. Results

Table 3 provides the descriptive statistics for the variables used in this research. The dependent variable WDI ranged from a minimum score of 0 to a maximum score of 17, with an average score of 3.186 and a standard deviation of 4.075. This indicates that the level of disclosure of the sample companies is still low and has a high variation. The variables that represent the power of government (GOVOWN) and foreign (FOROWN) shareholders have means of 8.709 and 3.232, with minimum scores of 0 and 0 and maximum scores of 98 and 85.61, respectively. This shows that shareholders of the agriculture industry are not concentrated in the government or foreign areas, so there are many shareholders in its ownership structure. The variable that represents creditor power (CRDPRS) has a low mean value of 1.499 (minimum value of 0.0006 and maximum value of 30.385). It can be assumed that there is low pressure presented by creditors to companies. In terms of categorical variables, 33 (17%) companies run their business internationally, whereas the remaining companies operate nationally. The means the control variables, namely, NATIDX, SIZE, ROA, and AGE, were 37.041, 12.541, 1.597, and 20.322, respectively.

Table 2
Variable definitions and measurement.

Variable	Definition	Measurement	Data source
Dependent variable			
WDI	Water disclosure index disclosed by the company	Total disclosed indicator of 24 water disclosure guidance from Morikawa et al. (2007)	Annual report, sustainability report
Independent variables			
GOVOWN	Government ownership represents the influence from government	Percentage of shares owned by government (Amran and Devi, 2008)	Annual report, sustainability report, OSIRIS database and company website
FOROWN	Foreign ownership represents the influence from foreign shareholders	Total percentage of shares owned by foreigners (Oh et al., 2011)	Annual report, sustainability report, OSIRIS database and company website
CRDPRS	The power of creditors to pressure the company	Total debts/total equity at the end of the year (Roberts, 1992)	Annual database, and OSIRIS database
INTOP	International operation of the company	1 for company having foreign sales, foreign subsidiaries, and/or foreign branches; and 0 otherwise (Sari et al., 2021)	Annual report, sustainability report, OSIRIS database and company website
Control variables			
NATIDX	Natural capital index of country that showed the availability of natural resources including water	Scores of country's natural capital index (SolAbility, n.d.)	Global sustainable competitiveness index (SolAbility)
SIZE	This variable represents the size of the company	Natural logarithm of total assets (Qa'dan and Suwaidan, 2019)	Annual report, OSIRIS database
ROA	This variable denotes firm profitability	Return on Assets (Hu et al., 2018)	Annual report, OSIRIS database
AGE	It shows the firm age	Number of years since the firm's inception (Muttakin and Subramaniam, 2015)	Annual report, sustainability report, OSIRIS database and company website

Table 3
Descriptive statistics.

Panel A: Continuous Variables

Variables	Mean	Std. Deviation	Min	Max
WDI	3.186	4.075	0	17
GOVOWN	8.709	19.433	0	98
FOROWN	3.232	11.897	0	85.61
CRDPRS	1.499	2.553	0.0006	30.385
NATIDX	37.041	8.422	20.4	63.4
SIZE	12.541	2.464	0.871	18.355
ROA	1.597	12.088	−85.380	33.930
AGE	20.322	18.256	1	110

Panel B: Categorical Variable

Variable	Number of Firms	Percentage
INTOP		
Company operates internationally	33	17
Company operates nationally	162	83

Note: WDI=Water disclosure index; GOVOWN = Government ownership; FOROWN=Foreign ownership; CRDPRS=Creditor power; INTOP=International operation; NATIDX=Natural capital index; SIZE=Firm size; ROA = Firm profitability; AGE = Firm age.

Table 4 presents the correlation matrix among the examined variables. The water disclosure index (WDI) is positively correlated with government ownership (GOVOWN (ρ = 0.1009), foreign ownership (FOROWN (ρ = 0.1553), creditor power (CRDPRS (ρ = 0.0625), and international operation (INTOP (ρ = 0.1871)). The WDI score is also positively correlated with the control variables natural index (NATIDX (ρ = 0.1642), firm size (SIZE (ρ = 0.1283), and firm age (AGE (ρ = 0.3203)). Firm profitability (ROA (ρ = −0.0172) is surprisingly negatively correlated with WDI. The coefficients of correlation of all variables are less than 0.8, so that there is no multicollinearity problem according to the rule of thumb from Gujarati (2004). The values of the tolerance and *variance inflation factor* (VIF) for predictor variables in the regression model are greater than 0.1 and smaller than 10, respectively (see Appendix 2). Accordingly, it can be said that there is no serious multicollinearity affecting the regression result.

To test the developed hypotheses, this paper conducted the Hausman test and found that random effect model (REM) was the best model for the analysis. Table 5 reports the regression results, using WDI as a variable-dependent variable. In Model 1, this paper finds a positive and significant coefficient of the government ownership (GOVOWN) variable (β = 0.0072, $p < 0.05$). This shows that higher government ownership results in a higher extent of water disclosure, thus supporting *H1*. This finding is consistent with the finding of Muttakin and Subramaniam (2015) in India. It is likely that the government influences companies to take action on water responsibility because government-owned companies are more visible in the public eye (Sari et al., 2021). It is clear that the government has a duty to maintain and increase public quality of life. As water is an essential resource for human life and for economic growth (Hou et al., 2020, 2021), the government needs to ensure that agricultural companies do not abuse water sources and contribute to water shortages. When the government holds a company's shares, the government can drive the company's direction to comply with standards and regulations to promote sustainable companies and to be accountable and transparent to all stakeholders.

In Model 2, this research investigates the impact of foreign ownership (FOROWN) on water disclosure and documents a positive significant coefficient (β = 0.0148, $p < 0.05$). This result supports *H2*. This implies that the higher ownership of foreign investors creates a higher level of water disclosure practices. This result is in line with the findings of Khan et al. (2013) and Ismail et al. (2018), who documented a positive association between foreign ownership and CSR-related disclosure. This indicates that foreign shareholders have difficulty obtaining corporate information because of the geographic distance between companies and shareholders. Foreign investors thus experience significant information asymmetry (Haniffa and Cooke, 2005). It is therefore foreign shareholders who tend to demand a high level of corporate disclosure to reduce this information asymmetry. In addition, foreigners may take into consideration a company's CSR practice for making investment decisions, as investing in foreign countries is considered risky because of the difficulties of gathering information (Oh et al., 2011).

Table 5
Regression results of water disclosure.

Variable	(1)	(2)	(3)	(4)	(5)
GOVOWN	0.0072 **(0.0465)** **				0.0070 **(0.0536)** *
FOROWN		0.0148 **(0.0131)** **			0.0129 **(0.0391)** **
CRDPRS			0.0341 (0.3963)		0.0370 (0.3522)
INTOP				0.5223 **(0.0047)** ***	0.4622 **(0.0178)** **
NATIDX	0.0186 **(0.0601)** *	0.0107 (0.3052)	0.0190 **(0.0613)** *	0.0161 (0.1041)	0.0086 (0.4140)
SIZE	0.0909 **(0.0058)** ***	0.0763 **(0.0212)** **	0.0823 **(0.0166)** **	0.0736 **(0.0263)** **	0.0628 **(0.0694)** *
ROA	0.0042 (0.2298)	0.0035 (0.3201)	0.0035 (0.3270)	0.0035 (0.3137)	0.0032 (0.3697)
AGE	0.0243 **(0.0000)** ***	0.0255 **(0.0000)** ***	0.0249 **(0.0000)** ***	0.0236 **(0.0000)** ***	0.0240 **(0.0000)** ***
Hausman test (p-value)	0.8892	0.6360	0.9509	0.9312	0.7886
R^2 (between)	0.1291	0.1304	0.1249	0.1378	0.1493
F-stat	14.8200	15.3219	13.9627	15.7470	10.9854
Prob. (F-stat)	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The dependent variable, water disclosure, is measured by the total disclosed water indicator; GOVOWN = Government ownership; FOROWN=Foreign ownership; CRDPRS=Creditor power; INTOP=International operation; NATIDX=Natural capital index; SIZE=Firm size; ROA = Firm profitability; AGE = Firm age. Column (1) reflects the regression result of GOVOWN and control variables. Column (2) presents the result regarding the analysis of FOROWN as an independent variable and all control variables. Column (3) documents the regression coefficient for the model involving CRDPRS and control variables. Column (4) represents the coefficient of INTOP and control variables in a model. Column (5) reports the regression result for the model that includes all examined variables. *, **, ***, represent significance at 10%, 5%, and 1%, respectively.

In Model 3, this study finds an insignificant coefficient of creditor power (CRDPRS). In other words, *H3* is not supported. This is in line with the findings of Giannarakis (2014), who documents an insignificant relationship between leverage as a proxy for creditors and CSR disclosure. This result shows that creditors are not interested in influencing companies to conduct water disclosure practices. It can be assumed that water disclosure is not important information for creditors to make financing decisions, although the agriculture industry is categorized as the most water-sensitive industry. As other stakeholders start to press companies, it seems that creditors do not want to engage in more corporate water disclosure. Creditors expected companies to disclose a broader CSR disclosure than a specific subset of CSR reporting (Roberts, 1992). However, creditors still use water disclosure to assess the

Table 4
Correlation analysis result.

	WDI	GOVOWN	FOROWN	CRDPRS	INTOP	NATIDX	SIZE	ROA	AGE
WDI	1								
GOVOWN	0.1009**	1							
FOROWN	0.1553***	0.0547	1						
CRDPRS	0.0625	−0.0434	−0.0015	1					
INTOP	0.1871***	0.0320	0.2062***	0.0555	1				
NATIDX	0.1642***	0.0630	0.3095***	−0.0051	0.1233***	1			
SIZE	0.1283***	−0.0387	0.0659	0.1823***	0.1513***	−0.1774***	1		
ROA	−0.0172	−0.0383	−0.0227	0.0427	−0.0382	−0.0405	−0.3864***	1	
AGE	0.3203***	0.0666	0.0841*	0.0150	0.1740***	0.3651***	0.1416***	−0.0552	1

Note: WDI=Water disclosure index; GOVOWN = Government ownership; FOROWN=Foreign ownership; CRDPRS=Creditor power; INTOP=International operation; NATIDX=Natural capital index; SIZE=Firm size; ROA = Firm profitability; AGE = Firm age. *, **, ***, represent significance at 10%, 5%, and 1%, respectively.

potential risk of business operations in terms of nonfinancial risk (Chang, 2013; Yu et al., 2020).

Model 4 results indicate a positive and significant coefficient (β = 0.5223, $p < 0.01$) for the international operation (INTOP) variable, which supports *H4*. This is consistent with the findings of Sari et al. (2021), who report a positive and significant association between international operation and social disclosure. This indicates that companies receive pressure from international stakeholders because they use their water sources and decrease their availability to society. Overseas stakeholders play an active role in influencing companies to be responsible for their negative impact. It is clear that companies exploit water sources from other countries to run their businesses, which decreases the water supply and increases demand. Foreign stakeholders push companies to preserve water availability in their country, as it is the basic need for human life, ecosystems, and economics. Water disclosure practices are necessary for companies to maintain their legitimacy for surviving in international arenas.

In Model 5, this study includes all the hypothesized variables. The results are consistent with the findings in Models 1–4. Regarding the control variables, the overall findings document that larger firm size (SIZE) and firm age (AGE) are significantly related to higher water disclosure practices.

This study undertook additional analysis, which is presented in Table 6. In Panel A, the samples were decomposed based on the continent of the company. The results show that government ownership (GOVOWN) is positively significant on all continents. This implies that all governments across the globe use their power to press companies to perform water responsibility activities, as water scarcity is a global issue. In terms of foreign ownership (FOROWN), there is a positive and significant association in Asia and Africa and Oceania but a negative and significant association in Europe and (North and South) America. This is because investors from America and Europe usually invest their resources in other continents, such as Asia, which is in the top rank of foreign direct investment (United Nations Conference on Trade and Development (UNCTAD), n.d.). In addition, investors from Western countries tend to ask companies to disclose their responsible practices because they are very familiar with the concept of CSR disclosure (Huafang and Jianguo, 2007). The results show that creditors do not significantly influence water disclosure practices on all continents. On the other hand, international operation significantly influences water disclosure practices in the agriculture industry on the whole continent. This implies that agricultural companies that operate internationally tend to disclose more water-related disclosure regardless of the continent.

In Panel B, the samples are investigated based on two scenarios. First, this study splits the samples according to country category, namely, developed and developing countries. Government ownership (GOVOWN) and international operation (INTOP) are positively significant in developed and developing countries. This result is consistent with the previous analysis in this paper. The result indicates a positive and significant coefficient for foreign ownership (FOROWN) in developing countries. This implies that companies in developing countries receive pressure from their foreign shareholders, especially from Western countries, which are known to have more experience in CSR-related disclosure practices (Dyck et al., 2019). In terms of the creditor effect (CRDPRS), there is no significant influence in either developed or developing countries.

Second, this study divides the samples into two groups based on the score of the natural index, which is provided by SolAbility, namely, high and low natural indices. If the country's mean is above the total mean of 37.041, it is categorized into a high natural index, and otherwise a low natural index. Government ownership (GOVOWN) and international operation (INTOP) once again significantly influence water disclosure in countries with high and low natural indices. Interestingly, there is a positive and significant coefficient for foreign ownership (FOROWN) in countries with a low natural index. This indicates that foreign shareholders in these countries take an active role in preserving water availability because of the low water level. Creditors (CRDPRS) are also not interested in using their power to influence managers to disclose water information in these country categories.

Because research sample is dominated by Chinese companies, this

Table 6
Regression results for categories.

Panel A: Continents				
Variable	Asia	Europe	Americas	Africa & Oceania
GOVOWN	0.0096 **(0.0077)*****	0.0160 **(0.0364)****	0.2513 **(0.0419)****	0.1376 **(0.0517)****
FOROWN	0.1011 **(0.0000)*****	−0.0131 **(0.0003)*****	−0.1823 **(0.0377)****	0.0410 **(0.0617)****
CRDPRS	0.0275 (0.4879)	0.1138 (0.3378)	0.3283 (0.1539)	−0.0684 (0.2185)
INTOP	0.6917 **(0.0003)*****	0.4932 **(0.0441)****	0.3512 **(0.0042)*****	0.2731 **(0.0014)*****
NATIDX	−0.0694 **(0.0003)*****	−0.0216 **(0.0348)****	0.1441 **(0.0720)***	−0.1888 **(0.0014)*****
SIZE	0.0716 **(0.0670)***	0.4018 **(0.0000)*****	−0.1535 (0.4911)	−0.5978 **(0.0005)*****
ROA	0.0033 (0.2984)	−0.0098 (0.1570)	0.0036 (0.4536)	0.0938 **(0.0003)*****
AGE	0.0037 (0.5750)	−0.0094 **(0.0000)*****	0.1121 **(0.0023)**	−0.0168 **(0.0443)****
Hausman test (p-value)	0.3718	0.8428	0.9336	0.4391
R^2 (between)	0.2576	0.3154	0.3116	0.2331
F-stat	14.7081	11.8306	5.2894	9.4520
Prob. (F-stat)	0.0000	0.0000	0.0004	0.0002
Panel B: Country categories and natural capital index				
Variable	**Developed Countries**	**Developing Countries**	**High Natural Index**	**Low Natural Index**
GOVOWN	0.01523 **(0.0036)*****	0.0066 **(0.0442)****	0.1377 **(0.0440)****	0.0078 **(0.0348)****
FOROWN	0.0129 (0.1270)	0.0118 **(0.0734)***	−0.0086 (0.3781)	0.0398 **(0.0000)*****
CRDPRS	0.0581 (0.0028)	0.0312 (0.3566)	0.0433 (0.6027)	0.0181 (0.6486)
INTOP	0.5023 **(0.0454)****	0.1943 **(0.0411)****	0.3612 **(0.0003)*****	0.5309 **(0.0059)*****
NATIDX	−0.0196 **(0.0854)***	0.0265 **(0.0042)*****	0.0711 **(0.0329)*****	−0.4213 **(0.0000)*****
SIZE	0.1225 **(0.0313)****	0.0095 (0.7304)	0.0587 (0.3414)	0.0730 **(0.0635)***
ROA	0.0579 (0.1821)	0.0191 **(0.0091)*****	0.0223 (0.1590)	0.0034 (0.2808)
AGE	0.0358 **(0.0000)*****	0.0165 **(0.0000)*****	0.0263 **(0.0001)*****	−0.0042 (0.3420)
Hausman test (p-value)	0.8267	0.1004	0.1075	0.2002
R^2 (between)	0.2108	0.2437	0.3114	0.3485
F-stat	11.0616	5.6436	6.0366	19.8032
Prob. (F-stat)	0.0000	0.0000	0.0000	0.0000

Note: The dependent variable, water disclosure, is measured by the total disclosed water indicator; GOVOWN = Government ownership; FOROWN=Foreign ownership; CRDPRS=Creditor power; INTOP=International operation; NATIDX=Natural capital index; SIZE=Firm size; ROA = Firm profitability; AGE = Firm age. Panel A provides regression results of sample firms' continents. Panel B reports the coefficient regression of independent variables in developed, developing, high, and low natural capital index countries. *, **, ***, represent significance at 10%, 5%, and 1%, respectively.

paper compares the regression result between China and other countries. The results are presented in Table 7. Firstly, it can be seen that there is significant relationship between government ownership (GOVOWN) and water disclosure in both China and other countries. It shows that government want to make sure that agriculture companies do not result negative impact to water availability. International operation (INTOP) also significantly influences water disclosure in all countries. It describes that international stakeholder actively influences company to perform water responsibility activities. On the other hand, foreign ownership (FOROWN) is significant in other countries but not in China. Finally, creditor (CRDPRS) is insignificant in both groups.

This paper conducts a robustness test to ensure that the research model in this study is robust. This research changes the dependent variable measurement with the number of words of water-related disclosure (Sari et al., 2021; Gao et al., 2005; Rao and Tilt, 2016). The results show that all hypothesized variables are constant to those represented in Table 5. In addition, this study shifts the data analysis technique from a random effect model (REM) to a generalized method of moment (GMM) and reports consistent results. All robustness test output can be seen in Appendix 3.

5. Implications

5.1. Theoretical implications

This study has several important implications. First, this research investigates water disclosure practices based on agriculture companies worldwide. Although this industry is considered the most water-sensitive industry, there is no previous research examining water disclosure in this industry. Previous water disclosure research found that water-sensitive industries provided more water-related disclosure (Burritt et al., 2016; Zhang et al., 2021; Yu, 2021; Yu et al., 2020). However, this finding is not followed by other research to investigate more water disclosure practices in water-sensitive industries. There are relatively few papers that discuss water responsibilities, especially water disclosure, even as attention to water-sensitive industries is growing, as they highly contribute to water shortages. This study therefore addresses this gap by investigating water disclosure practices in agriculture companies using the stakeholder theory perspective.

Table 7
Regression results for China and other countries.

Variables	China	Other countries
GOVOWN	0.0143	0.0167
	(0.0263)**	**(0.0289)****
FOROWN	0.0160	0.0172
	(0.3333)	**(0.0311)****
CRDPRS	−0.0001	0.0650
	(0.9867)	(0.4270)
INTOP	0.1321	0.1958
	(0.0278)**	**(0.0046)*****
NATIDX	0.0392	0.0024
	(0.7125)	(0.8942)
SIZE	0.0188	0.0889
	(0.0836)*	**(0.0829)***
ROA	0.0028	0.0206
	(0.5629)	(0.1647)
AGE	0.0028	0.0211
	(0.8085)	**(0.0024)*****
Hausman test (p-value)	0.7989	0.9800
R^2 (between)	0.1091	0.1568
F-stat	7.4781	9.8197
Prob. (F-stat)	0.0000	0.0000

Note: The dependent variable, water disclosure, is measured by the total disclosed water indicator; GOVOWN = Government ownership; FOROWN = Foreign ownership; CRDPRS= Creditor power; INTOP=International operation; NATIDX=Natural capital index; SIZE=Firm size; ROA = Firm profitability; AGE = Firm age.

Second, this research supports stakeholder theory as the findings indicate that water disclosure is produced to satisfy stakeholder's demands. This study documents that government and foreign ownership are significantly associated with water disclosure. This indicates that shareholders are playing an active role in influencing managers to disclose more water-related information. State-owned companies receive greater attention from the public eye, including responsibility activities, so that the government drives companies to be concerned about water sustainability. Foreign investors demand a high level of disclosure to reduce information asymmetry and monitor the company. This research also finds that companies that operate internationally face pressure from international stakeholders to be responsible for water because they use international water sources. Interestingly, this study discovers that creditors are not interested in engaging in corporate water disclosures.

5.2. Practical implications

This paper suggests that agriculture companies enhance their concern for water sustainability. Reflecting on the results in this study, stakeholders are starting to place their attention on water responsibility practices because the agriculture industry highly contributes to water scarcity. If the company fails to manage its water usage, the company breaks its obligation so that stakeholders revoke the social contract. Managers are recommended to engage more with stakeholders to understand their expectations of companies. It is necessary to ensure that a company's value aligns with stakeholders; therefore, its legitimacy can be maintained. In addition, managers are suggested to make policy associated with water. This policy is a commitment from company to preserve water from water crisis. Water policy will guide company to use water wisely so that business operation is expected resulting minimum negative impact to water. Thus, stakeholder will be satisfied because company has shown their accountability and transparency through water policy and water disclosure practices (Zhang et al., 2021).

6. Conclusions

Drawing upon stakeholder theory, this paper investigates the impact of different kinds of stakeholder pressure on water disclosure in agricultural firms. Previous studies have examined stakeholder influences using corporate characteristics as a proxy for stakeholders. However, there is no research analyzing the effect of the different types of ownership and international stakeholders on water disclosures. The results of the study highlight that both government and foreign ownership have positive impacts on the level of water disclosures. This paper also indicates that international operation is strongly associated with a greater level of water disclosure. In contrast, this research finds an insignificant relationship between creditors and water disclosure. These results enrich other earlier studies that predominantly focused only on examining water disclosure and corporate characteristics.

The present study offers several important contributions. First, this study investigates water disclosure practices where the number of published papers on this disclosure practice is considered small. Currently, there is growing attention on water sustainability, as the amount of fresh water on earth is decreasing. Industry is deemed a significant contributor to water shortages so that companies receive pressure from stakeholders to take action to maintain water availability and implement disclosure practices. Second, this paper examines water disclosure practices in the agriculture industry, which is known as the most water-sensitive industry. Previous studies found that higher water-sensitive industries tend to disclose more water information than lower water-sensitive industries. However, no earlier studies examined water disclosure practices in more sensitive industries. Third, from a theoretical perspective, the results of this study support stakeholder theory. This is because corporate water disclosure is used to maintain good relationships between companies and stakeholders. On the other hand,

companies also receive pressure from stakeholders to show their responsibility to the water through water disclosures. As the most water-sensitive industry, it can be argued that there is a higher demand from stakeholders to the agriculture industry for greater water responsibilities. This study shows that all stakeholders positively influence water disclosure practices, although the creditor effect is insignificant. Finally, the research findings imply that managers should recognize stakeholder demands by engaging in more water action and disclosure to fulfill their expectations.

This study has several research limitations that should be revealed. First, this study only included agriculture companies that were available in the OSIRIS database as the samples. This research possibly missed other listed agriculture companies outside the database. Second, based on the statistical results in Table 5, the R^2 value was considered small. This means that the model presents little enlightenment on water disclosure. This provides room for future study to develop the model to provide a stronger explanation. According to these limitations, this study presents several suggestions for further study. First, future research may consider assessing broader stakeholder groups and/or ownership structures to investigate water disclosure practices. Second, as this paper analyzed water disclosure practices in listed agriculture companies, it is recommended that further study includes unlisted companies to capture better insight into water-related disclosure in the agriculture industry. Additionally, future research is suggested to conduct a comparative study analyzing water disclosure practices in both listed and unlisted companies. Finally, in terms of analyzing water disclosure practices in high water-sensitive industries, future studies can also add other high water-risk industries to the investigation to capture stories from other high-water users.

CRediT authorship contribution statement

Aditya Pandu Wicaksono: Conceptualization, Methodology, Data curation, Investigation, Formal analysis, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Doddy Setiawan:** Conceptualization, Methodology, Data curation, Investigation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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LIST OF APPENDICES

Appendix 1. Water-related disclosure indicators

Measure water use
Assess water risk
Consult stakeholders
Engage supply chain
Water statement/policy
Water goals and targets
Quantitative target
Target water use
Target wastewater
Best available technology
Water risk in decision making
Measure and report performance
Report freshwater use
Report wastewater quality
Report wastewater volume
Report water recycling
Report in absolute value
Report in normalized value
Report both in absolute and normalized value
Trends reporting
Regional/facility-based reporting
Use GRI
Strategic partnership
Continuous improvement

Source: Morikawa et al. (2007).

Appendix 2. Multicollinearity test results for predictor variables

Variables	Code	Tolerance	VIF
Government Ownership	GOVOWN	0.984	1.016
Foreign Ownership	FOROWN	0.854	1.172
Creditor	CRDPRS	0.944	1.059
International Operation	INTOP	0.915	1.092
Natural Index	NATIDX	0.725	1.380
Firm Size	SIZE	0.824	1.214
Firm Profitability	ROA	0.929	1.077
Firm Age	AGE	0.799	1.251

Appendix 3. Robustness test result

Variables	Words	GMM
GOVOWN	0.2217	0.0776
	(0.0449)**	**(0.0565)***
FOROWN	0.4864	0.0169
	(0.0110)**	**(0.0348)****
CRDPRS	0.2136	0.0458
	(0.5589)	(0.5835)
INTOP	0.4224	0.4142
	(0.0571)*	**(0.0718)***
NATIDX	0.3764	0.0054
	(0.2405)	(0.6794)
SIZE	0.4639	0.0169
	(0.0683)*	**(0.0504)****
ROA	0.2392	0.0081
	(0.1949)	(0.481)
AGE	0.7403	0.0188
	(0.0000)***	**(0.0002)*****
R^2	0.1500	0.1288
F-stat	11.3805	
Prob. (F-stat)	0.0000	

Note: Column (words) presents the regression results using total water-related words to measure the dependent variable. Column (GMM) documents regression results using GMM. GOVOWN = Government ownership; FOROWN=Foreign ownership; CRDPRS=Creditor power; INTOP=International operation; NATIDX=Natural capital index; SIZE=Firm size; ROA = Firm profitability; AGE = Firm age. *, **, ***, represent significance at 10%, 5%, and 1%, respectively.

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