CORPORATE SOCIAL RESPONSIBILITY AND FIRM PERFORMANCE: MODIFIED SOCIAL CONTRIBUTION VALUE PER SHARE

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How to cite this paper: So, S. M. S. (2021). Corporate social responsibility and firm performance: Modified social contribution value per share. *Risk Governance and Control: Financial Markets & Institutions, 11*(2), 32–46. https://doi.org/10.22495/rgcv11i2p3

ISSN Online: 2077-4303
ISSN Print: 2077-429X

Received: 23.01.2021
Accepted: 23.04.2021

JEL Classification: G21, G32, O16
DOI: 10.22495/rgcv11i2p3

Abstract

This study attempts to enhance the corporate social responsibility (CSR) performance measurement by introducing the concept of environmental contributions. As suggested by Xu and Zhu (2010), we modify the formula of social contribution value per share (SCVPS) developed by the Shanghai Stock Exchange (SSE) in 2008 by employing two environmental elements, namely, the audited environmental cost (AEC) and additional audited environmental cost (AddAEC). Using pooled least square regressions to examine the relationship between the two modified SCVPSs, under the accrual basis and the cash basis, and the performance of the listed firms in the SSE social responsibility index, we find that they have a positive relationship — a larger modified SCVPS corresponds to better CSR performance and firm performance. Our results for the two modified SCVPSs are relatively unaffected by the different ownership structures, state-owned (SO) and non-state-owned (NSO). Evidence also indicates that the influence on firm performance of the modified SCVPS under the accrual basis is more significant for SO firms than NSO firms. Companies are encouraged to increase their environmental contribution and SCVPS to go beyond the minimum environmental protection standards.

Keywords: Corporate Social Responsibility, Firm Performance, SCVPS, State-Owned Firms

Authors' individual contribution: The Author is responsible for all the contributions to the paper according to CRediT (Contributor Roles Taxonomy) standards.

Declaration of conflicting interests: The Author declares that there is no conflict of interest.

1. INTRODUCTION

As a shareholder agent, the main goal of company management is to maximize shareholder wealth, and shareholders generally regard corporate social responsibility (CSR) as an expense. Faller and zu Knyphausen-Aufseß (2018), however, argue that the benefits of CSR for shareholders exceed the direct return on financial investment. Many studies have looked at the narrative information disclosed in annual reports and used the standard dummy method to examine the effects of disclosing CSR on firm performance (Barnea & Rubin, 2010; Lins, Servaes, & Tamayo, 2017). Other studies have quantified corporate social contributions and measured the association between investor attitudes and CSR (Maas, 2018; Noronha, Guan, & Fan, 2018). As companies have begun to disclose CSR performance in their annual reports — to improve their reputation as corporate citizens and enhance their value — researchers have begun to study the social performance indicator (SPI) to improve the quantification of CSR performance.

The United States and developed countries in Europe have established some remarkable SPIs, such as the Domini 400 Social Index (Carini, Comincioli, Poddi, & Vergalli, 2017), the FTSE4Good Index

(Carini et al., 2017; Gjølberg, 2009), the Dow Jones Sustainability Index (Gjølberg, 2009; López, Garcia, & Rodriguez, 2007), and the social return on investment (SROI) (Adam & Shavit, 2008; Brammer, Brooks, & Pavelin, 2006). However, these SPIs have their limitations; for example, third-party development of the Domini 400 Social Index and FTSE4Good Index, indicates a lack of transparency. While different accounting standards in developed and developing countries can make it difficult to implement these SPIs in the latter, SPIs are improving the awareness of sustainable development among researchers in developing countries.

In 2008, the Shanghai Stock Exchange (SSE) announced a new social contribution indicator, the social contribution value per share (SCVPS), enabling the public to objectively quantify a company's CSR performance (Farag, Meng, & Mallin, 2015). SCVPS is an official SPI of the firms listed on the SSE. Its unique calculation method satisfies Chinese accounting standards. In a recent paper, Zhang, Noronha, and Guan (2018) illustrated a primary advantage of SCVPS over SPIs in other developed countries. The SSE uses generally accepted variables to develop the formula for SCVPS. These variables are easily obtained from financial statements published by the listed firms. However, the authors also suggest that there is still room for improvement in SCVPS calculations.

Guan and Noronha (2013) state that many CSR documents in China are only descriptive or conceptual, not practical. Considering all factors at once (to measure social cost) is technically challenging. Therefore, this study focuses only on expenses and environmental contributions, which are the central parts of social cost measurement. Xu and Zhu (2010) proposed using green national economic accounting methods to estimate a company's total environmental contributions. Conceptually, the authors recommend two auxiliary elements, both related to the environment, to supplement the current SCVPS. The first is the audited environmental cost (AEC), which refers to the company's actual contribution to protecting the environment; this is the positive element. These contributions have occurred and been recognised in financial statements. The second element is the additional audited environmental cost (AddAEC). This is the negative element; it refers to the amount the company will still need to spend on environmental protection if it wishes to restore the environment entirely. Expenditures that have not occurred cannot be recognised in the company's financial statements.

This study does not focus on the complex process and method of green national economic accounting. The two environmental elements introduced in this study are based on the "2004 Green National Economic Accounting Research Report" issued by the China Academy of Environmental Planning (CAEP) in 2006 (Wang, Yu, & Cao, 2006).

Motivated by the lack of measurement of environmental contributions in the current SCVPS, the primary objective of this study is to estimate companies' environmental contributions by using Xu and Zhu's (2010) concepts of AEC and AddAEC. Then, we add these two environmentally friendly components to the current SCVPS and form two modified SCVPSs. We propose that these two modified SCVPSs can compensate for the absence of environmental contributions in the process of disclosing CSR performance. Finally, we examine the relationship between the two modified SCVPSs, under an accrual basis and a cash basis, and the performance of the listed firms in the SSE social responsibility index.

Sample data from 81 stocks listed in the SSE social responsibility index (SRI)[1] from 2008 to 2018 are used to explore any relationships between the current SCVPS, the two modified SCVPSs, AEC, and AddAEC, and four selected firm-performance measures, namely, Tobin's Q (TQ), return on assets (ROA), return on equity (ROE), and price-to-book ratio (PB). Results from our pooled least squares regressions suggest that the two modified SCVPSs have a significantly more positive relationship with firm performance than the current SCVPS. This means that the higher the modified SCVPS, the better the firm performance will be, a finding that encourages companies to pursue better CSR performance, which is measured by the modified SCVPSs. Modified SCVPSs of state-owned (SO) firms have a significantly positive relationship with their firm performance, and the positive relationship results are better than those of non-state-owned (NSO) firms. Since the government has higher requirements regarding the CSR of SO companies, these requirements may help them improve their CSR performance with a high modified SCVPS value.

The remainder of the paper is organised as follows. Section 2 reviews some related literature on CSR and SCVPS. Section 3 outlines the data and methodologies employed in the study. Section 4 reports the empirical results, and Section 5 concludes our findings.

2. LITERATURE REVIEW

2.1. The development of corporate social responsibility

There has been no clear definition of CSR since it was put forward as a concept. One early scholar, Bowen (1953), proposed that enterprises have an obligation to pursue policies, make decisions, and follow their lines of action in accordance with the goals and values of the society. Davis (1960) claimed that enterprise is a social institution that must use power responsibly and defined social responsibility as a "nebulous idea" that refers to the decisions and actions taken by enterprises for some reasons at least partially exceed the direct economic or technical benefits of the enterprise. Walton (1967) argued that enterprises have not only economic and legal obligations but also certain responsibilities relative to society.

During the 1970s and 1980s, the definition extended to different perspectives. Johnson (1971) offered an expanded view of CSR, which included employees, suppliers, dealers, local communities, and the nation, and argued that a socially responsible enterprise should not strive only for larger profits for its shareholders. Carroll (1979)

[1] In 2007, the SSE released the Shanghai Stock Exchange Corporate Governance Index (SSE CGI, index code 000019), which includes all the stocks from the SSE Corporate Governance board. In 2009, the SSE released the SSE Social Responsibility Index (SSE SRI, index code 000048). The SSE SRI is based on SCVPS as a ranking to select the top 100 stocks in the SSE CGI.

defined CSR as a multidimensional construct that has four components: economic responsibility to investors and consumers, legal responsibility to the government or the law, ethical responsibilities to society, and discretionary responsibility to the community. From a stakeholder theory perspective, Freeman (1984) formulated the definition of stakeholders as those individuals or groups who are influenced by or have an influence on the enterprise's activities. Freeman believed that enterprises must clarify internal and external needs in order to realise the necessary exchange of resources to enable their sustainable development. Wartick and Cochran (1985) attempted to show that there is an underlying and continuous interaction between and among the principles of social responsibility, the processes of social responsiveness, and the policies and programs developed to address social issues. Cornell and Shapiro (1987) believed that enterprises should meet the needs of various non-owner stakeholders, not just the needs of shareholders and creditors.

The 1990s began the era of global corporate citizenship. Since then, CSR has received extensive attention from various organizations. The World Business Council for Sustainable Development (1990) defined CSR as the ethical behaviour and commitment of an enterprise to maintain the relationship between stakeholders, develop the quality of working life in the enterprise, and improve society. In 2002, the European Commission defined CSR as an enterprise's moral obligations and ethical responsibilities, incorporating social and environmental issues into its business operations and voluntarily interacting with stakeholders.

The definition of CSR and its connotations have seen rich development in recent research. CSR seems to be an enterprise's commitment which can be interpreted as the basic moral constraints that an enterprise actively accepts in the process of its operation and development in order to maintain its competitive advantage and secure its position in the market (Holme, 2010).

2.2. Corporate social responsibility in China

In the last century, China was still at an exploratory stage of social responsibility. Most companies had no concept of it. Corporate responsibility disclosure in China is mainly focused on company financial information rather than social and environmental performance. Nevertheless, companies and governments began to learn and absorb Western theories of CSR and understand its connotations.

In recent decades, China has experienced dramatic economic growth and has become the largest developing country in the world. People around the globe have been paying attention to Chinese companies' CSR performance. Lu (2002) asserted that CSR is closely related to the economic value of an enterprise. It should not only pay attention to promoting the maximisation of shareholder value but also fulfil the obligation of social interest. Zhang (2010) suggested that Chinese enterprises should disclose social responsibility information in terms of accounting performance impact and accounting elements, which requires adding economic factors to social responsibility reports. Xu and Zhang (2015) reported that the disclosure of more social, economic, and environmental information in CSR reports was gradually becoming a trend for enterprises in China.

As China enjoyed rapid economic growth, the Chinese government became aware of the importance of CSR and began to put forward social responsibility requirements for companies to fulfil. CSR has been written into law, and various industries have issued guidelines and regulations to promote CSR disclosure. In the Chinese financial market, these include "Social Responsibility Instructions to Listed Companies" issued by the Shenzhen Stock Exchange in 2006, "Guidelines on Environmental Information Disclosure by Listed Companies" issued by the SSE in 2008, etc. These are milestones in the development of CSR in China, signalling that it has formally moved beyond the exploratory stage. Customers, as well as investors, have started to pay more attention to companies' CSR performance and prefer socially responsible ones (Cox, Brammer, & Millington, 2004; Ramasamy & Yeung, 2009). Compared with other countries, however, China's CSR practice is still not well developed.

2.3. Social contribution value per share

In 2008, SSE launched SCVPS to quantify CSR by partitioning CSR into several components of a company's activities including economic performance, investment in social contributions, and environmental costs. Although the disclosure of SCVPS is not mandatory, companies may disclose SCVPS in their annual social responsibility reports. This gives the public a more comprehensive knowledge of the value estimated by the companies for different stakeholders. Unlike content analysis, SCVPS quantifies the abstract concept of CSR to a certain extent. This makes a significant contribution to the development of CSR measurement and helps make up for the lack of quantified criteria of social information. The values of SCVPS are estimated by using the following formula:

$$SCVPS = total\ social\ contribution\ per\ share = EPS + \frac{(tax\ payment + employee\ expense + interest\ expense + total\ input\ in\ public\ good\ undertaking) - social\ cost}{total\ number\ of\ shares\ at\ the\ end\ of\ fiscal\ year} \quad (1)$$

The SCVPS formula includes an economic indicator (earnings per share) as well as a company's investment in social contributions and the cost of its social damage. The SCVPS is increased by social contribution, such as government taxes, salaries and benefits paid to employees, interest related to creditors, and total input in undertakings for the public good (such as donations). Conversely, social costs, such as expenditure in environmental governance, reduce SCVPS.

SCVPS measurement was basically developed on the stakeholder theory. Stakeholder theory is equivalent to the triple bottom line (TBL) framework, which consists of society (people), economy (profits), and environment (planet). Table 1 matches the components of the SCVPS formula to the respective TBL framework.

Table 1. Matching the components of SCVPS and the TBL framework

Components in SCVPS	*TBL framework*
Earnings per share	Economic (profit)
Tax payments to all levels of local and state taxes	Economic (profit)
Expenses paid to employees	Social (people)
Interest payments to creditors	Economic (profit)
Total input in public good undertaking	Social (people)
Social costs	Environmental and other aspects

As shown in the table, components of SCVPS match those of the respective TBL framework. However, the social costs component includes numerous elements, and the formula lacks elements related to the environment. Studies in the past 10 years have revealed two main ways for companies to disclose their social costs. One way is to consider environmental charges as negative social costs; the other is to provide a brief description of environmental cost information in the text or directly exclude all environmental cost information. Currently, the International Accounting Standards (IAS) do not have relevant rules for such accounting recognition. Environmental costs can be obtained intuitively from financial reports, mainly regarding pollution discharge fees. However, a company's environmental investment includes other elements, such as environmentally-friendly equipment and raw materials with low environmental pollution. According to the IAS, such environmental investments will be included in fixed assets and inventories rather than in a separate accounting of environmental investments or costs, significantly increasing the company's productivity and profitability compared with social costs. This imbalance has led to the measurement of environmental costs or contributions for which data could not be obtained intuitively from financial statements.

According to the IAS, there are two types of recognition basis: accrual basis and cash basis. The critical difference between them is the recognition period of income and expenditure. The current SCVPS does not specify data selection under either basis, so companies may choose data sources according to their preferences. As a result, SCVPS may be inconsistent for various companies.

SCVPS has existed in China for more than 10 years. The time is right for improving the concept behind it and driving enterprises to better fulfil their social responsibility. Chen and Kong (2012), Pan (2011), and Yang (2013) discuss the value relevance of SCVPS while Hong and Jin (2014), Sun, Zhao, and Zhang (2012) and Tian, Li, and Lv (2010) evaluate the practices of SCVPS. Gao (2009) and Xu and Zhu (2010) point out potential deficiencies of SCVPS and suggest conceptual ways to improve the formula behind it. Computation of SCVPS is obviously challenging; potential problems include inconsistency of data selection, non-standardised calculation methods, insufficient disclosure of SCVPS information, and lack of clarification of undefined contents, among others. There is still neither an official guideline nor accounting standard to ensure the reliability and comparability of SCVPS.

2.4. Corporate social responsibility and firm performance

Empirical evidence on the relationship between CSR and firm performance has been inconclusive, although positive relationships between the two have been reported in most studies. Carroll and Shabana (2010) claimed that, by adopting CSR activities, a firm may develop strong relationships with its stakeholders, lower employee turnover, access to a higher talent pool, and increase customer loyalty. Hansen, Dunford, Boss, Boss, and Angermeier (2011) found that employer CSR policies are related to employee attitudinal or behavioural outcomes, and suggested that corporate social performance may be associated with financial performance. While most researchers support CSR as a way for companies to promote corporate image and enhance their reputations among customers, employees, and shareholders (Tee, Roper, & Kearins, 2007; Porter & Kramer, 2002), Orlitzky and Benjamin (2001) argued that CSR performance and financial risk are negatively related. Cox et al. (2004) suggested that long-term institutional investment is positively related to CSR performance. Employee-based CSR performance has a stronger relationship with efficiency and risk reduction than community-based CSR performance. Van der Laan, Van Ees, and Van Witteloostuijn (2008) believed that undertaking CSR improves a company's profitability and financial performance. Chen and Wang (2011) found that companies engaging in CSR activities can improve their financial performance in China. Using a sample of 162 banks in 22 countries, Wu and Shen (2013) showed that CSR positively associates with financial performance. Yoon and Chung (2018) studied the effects of CSR on the firm performance of a sample of 59 publicly traded restaurant firms in the United States. They found that external CSR enhances a firm's market value while internal CSR increases a firm's operational profitability. The results of the study by Al-Malkawi and Javaid (2018) reveal that a strong positive relationship exists between CSR and corporate financial performance in a selected sample of 107 non-financial listed firms in the Saudi Arabian stock market from 2004 to 2013. Albuquerque, Koskinen, and Zhang (2019) found that CSR decreases systematic risk and increases firm value.

On the other hand, there are also empirical results indicating a negative relationship (Becchetti & Ciciretti, 2009; Nollet, Filis, & Mitrokostas, 2016). Using a sample of Canadian firms in 2004 and 2005, Makni, Francoeur, and Bellavance (2009) stated that socially responsible firms experienced lower profits and reduced shareholder wealth, which in turn limits socially responsible investments. Barnett and Salomon (2003) even stated that the relationship between CSR and firm performance may be non-linear instead of linear.

Our study conjectures that the two modified SCVPSs can compensate for the lack of environmental contributions in the process of disclosing CSR performance; hence we propose a positive relationship between the modified SCVPSs and firm performance in the Chinese stock market.

3. DATA AND METHODOLOGY

3.1. Sample selection

The SCVPS was introduced in 2008; hence our data set covered 11 years from 2008 to 2018. This study selected 100 stocks listed in the SSE SRI. Since 19 stocks were listed after 2009, the remaining sample comprises 81 stocks with a total of 891 yearly observations.

3.2. Methodology

Makni et al. (2008) employed the two-variable regression models to address the link between corporate social performance and financial performance (i.e., market returns, ROA, and ROE) by using two years' data from the Canadian Social Investment Database, while Chen and Wang (2011) conducted multiple regression analysis to investigate the causal relationship between CSR factors and corporate finance performance (i.e., return on sales, ROA, and growth rate of sales) by using the data obtained from self-designed questionnaires. Yoon and Chung (2018) ran panel regression with the fixed firm and year effects on financial performance (i.e., ROA and Tobin's Q) against internal and external stakeholder effects of CSR. In this study, the pooled least squares models are used to regress firm performance on each of the explanatory variables, which are *SCVPS*, *SCVPS_AC*, *SCVPS_CA*, *LN_AEC*, and *LN_AddAEC*. Therefore, there are five pooled least squares regressions:

$$FP_{i,t} = \alpha_t + \beta_1 SCVPS_{i,t} + \beta_j \sum control\ variable_{ji,t} + \varepsilon_t \quad (2)$$

$$FP_{i,t} = \alpha_t + \beta_1 SCVPS\_AC_{i,t} + \beta_j \sum control\ variable_{ji,t} + \varepsilon_t \quad (3)$$

$$FP_{i,t} = \alpha_t + \beta_1 SCVPS\_CA_{i,t} + \beta_j \sum control\ variable_{ji,t} + \varepsilon_t \quad (4)$$

$$FP_{i,t} = \alpha_t + \beta_1 LN\_AEC_{i,t} + \beta_j \sum control\ variable_{ji,t} + \varepsilon_t \quad (5)$$

$$FP_{i,t} = \alpha_t + \beta_1 LN\_AddAEC_{i,t} + \beta_j \sum control\ variable_{ji,t} + \varepsilon_t \quad (6)$$

where, $FP_{i,t}$ is one of the four measures of firm performance, TQ, ROA, ROE, and PB, of firm *i* at year *t*; $SCVPS_{i,t}$, $SCVPS\_AC_{i,t}$, $SCVPS\_AC_{i,t}$, $LN\_AEC_{i,t}$, and $LN\_AddAEC_{i,t}$ are the current SCVPS, SCVPS under the accrual basis, SCVPS under the cash basis, natural logarithmic of audited environmental cost, and natural logarithmic of additional audited environmental cost of firm *i* at year *t*, respectively; and $control\ variable_{ji,t}$ is the firm size of company *i* at year *t*. Every pooled least square regression is estimated by the industry and year fixed-effects model.

3.3. Explanatory and dependent variables

3.3.1. Measurement of environmental costs and modified SCVPSs

The current SCVPS has no clear guidelines for determining environmental costs and contributions. No accounting standard can support companies to recognise the audited environmental expenditures as a separate item in the financial statement. Xu and Zhu (2010) have provided a method that is used to estimate AEC, which states that AEC positively correlates with company performance. The data source of the estimation method was the "2004 Green National Economic Accounting Research Report", which was issued by the CAEP (Wang et al., 2006). In this study, the AEC is the sum of the estimated environment-related cost and investment. This study refers to these environment-related costs or investments collectively as "costs" because they are all environmental expenditures. AEC is the company's contribution to the environment and is estimated based on the audited financial statements. Therefore, AEC is a positive element related to the environment; that is, it belongs to the value-added component of SCVPS. The estimation formula is as follows:

$$AEC = revenue \times estimated\ AEC\ factor \times regional\ factor \times industry\ factor \quad (7)$$

Xu and Zhu (2010) recommend using revenue as the calculation basis for AEC, as environmental expenditure is usually positively correlated with the revenue of firms. The estimated AEC factor is defined as the factor that the company has contributed to the environment. China is a huge country; the geographical environments of the east, west, and central regions have vast differences in the availability of resources. Therefore, environmental expenditure is unbalanced across the regions, and the regional factor is used to adjust the environmental costs incurred in different regions. Moreover, different industries have different product properties and different impacts on the environment. The industry factor is suggested to adjust the degree of investment in environmental protection in various industries. The figures for the estimated AEC factor, regional factor, and industry factor in 2004 were calculated in the "2004 Green National Economic Accounting Research Report". In addition, the impact on the time value of these factors was adjusted using the growth rate of China's GDP from 2004 to 2018.

Companies use many raw materials obtained from the natural environment to produce goods and services. Xu and Zhu (2010) found that companies'

environmental expenditures far exceeded the calculated AEC. The reason for this is that if the company fully complies with regulations, instead of merely meeting the minimum level of environmental governance, it will have a significant environmental cost gap. However, from the perspective of strategic management, companies usually make environmental expenditures based on the principle of achieving the lowest cost of compliance. Xu and Zhu (2010) define these unrealised environmental expenditures as AddAEC, and the estimation formula is as follows:

$$AddAEC = revenue \times estimated\ AddAEC\ factor \times regional\ factor \times industry\ factor \quad (8)$$

The calculation principle of AddAEC is similar to AEC except for the estimated AddAEC factor. The estimated AddAEC factor is defined as the factor of unrealised environmental expenditures that the company needs to contribute to spending on environmental governance to fully comply with regulations.

The accrual basis and the cash basis are the two bases of accounting standards. This study considers both bases when modifying the current SCVPS formula and collects data from different financial statements. The data under the accrual basis are obtained from the income statement, including net profit, tax payments, employee expenses, and interest payments. In contrast, under the cash basis, the data are obtained from the cash flow statement. The donation comes from the notes to the financial statements. Our study uses the method outlined above to estimate both AEC and AddAEC.

The modified SCVPS under the accrual basis is as follows:

$$SCVPS\_AC = total\ social\ contribution\ per\ share\ under\ the\ accrual\ basis = \frac{(net\ profit + tax\ payment + employee\ expense + interest\ expense + donation + AEC) - AddAEC}{total\ number\ of\ shares\ all\ the\ end\ of\ fiscal\ year} \quad (9)$$

The SCVPS under the cash basis is as follows:

$$SCVPS\_CA = total\ social\ contribution\ per\ share\ under\ the\ cash\ basis = \frac{(operating\ cash\ flow + tax\ payment + employee\ expense + interest\ expense + donation + AEC) - AddAEC}{total\ number\ of\ shares\ all\ the\ end\ of\ fiscal\ year} \quad (10)$$

3.3.2. Firm performance

Market valuation and accounting net worth are the most commonly used methods to measure firm performance. Investors generally use Tobin's Q as a market valuation. ROA, ROE, and PB ratios are generally regarded as accounting net worth based on the company's financial statements.

Tobin's Q (TQ)

Tobin's Q is a widely used measure of firm performance. Researchers define it as the sum of the company's market value, the value of preferred stocks, and the value of the company's long-term debt to the book value of the company's total assets (Harjoto & Jo, 2011; Lehmann, 2019; Manchiraju & Rajgopal, 2017). Moreover, many studies generally regard Tobin's Q as an indicator of investment opportunities for potential and existing stock market investors (Cai, Jo, & Pan, 2012; Harjoto & Jo, 2011; Lehmann, 2019; Liang & Renneboog, 2017).

Tobin's Q conforms to the theoretical frameworks discussed in Section 2. First, investors are one of the stakeholders. An increase in Tobin's Q value proves that investors' expectations for the company's future investment will rise with the improvement of CSR performance. By increasing investment in CSR, companies can strengthen their "social contract". Society will provide companies with more resources to support their sustainable development. Furthermore, Tobin's Q is consistent with the concept of institutional theory. Since investors expect to invest in companies with a high Tobin's Q, the company will follow the institutional rules set by investors to attract investors. In addition, if a company can become an industry benchmark, it will gain a competitive advantage. Previous research indicates that there is a positive relationship between Tobin's Q and CSR performance (Cahan, De Villiers, Jeter, Naiker, & Van Staden, 2016; Cai et al., 2012; Harjoto & Jo, 2011).

Return on assets (ROA)

ROA represents the company's ability to generate operating returns from assets (Ball, Sadka, & Sadka, 2009; Cai et al., 2012; Harjoto & Jo, 2011). Companies will likely invest in many assets to enhance their CSR performance. Such investments include environmental production equipment (tangible assets) and the research and development of environmentally friendly products (intangible assets). As a result, improving CSR performance may prompt companies to increase asset investment or increase asset utilisation. Moreover, the better the CSR performance, the more revenue the company generates and the higher the ROA. Investors will have more confidence in companies with more operational assets.

Return on equity (ROE)

ROE is defined as the net income divided by shareholder equity, which is equal to the net assets of the company minus debt. The ROE is usually equivalent to the ROA (Bourveau, Lou, & Wang, 2018; Bushman, Hendricks, & Williams, 2016; Harjoto & Jo, 2011; Manchiraju & Rajgopal, 2017). There is evidence of a positive relationship between ROE and CSR performance (Harjoto & Jo, 2011; Lee & Park, 2009; Tang, Hull, & Rothenberg, 2012).

Price-to-book ratio (PB)

The PB ratio or market-to-book ratio is the ratio of market share price to book value per share. The market value of stocks measures the company's

future cash-flow capabilities. PB is an indicator commonly used by financial analysts as it can provide a valuable metric to check reasonable stock price growth.

A company's stakeholders, investors, and financial analysts are highly concerned about its PB; a company's image will be improved when it enhances environmental investment. Moreover, financial analysts might think that such companies have met the expectations of the "social contract", so they should have a higher PB. Previous studies show that a positive relationship between PB and CSR performance exists (Cheung, Tan, Ahn, & Zhang, 2010; Chih, Shen, & Kang, 2008; Penman, 1996; Wang, Qiu, & Kong, 2011).

3.3.3. Control variables

Firm size (SIZE)

The size of the company seems to be an "antecedent of legitimacy" (Aerts & Cormier, 2009). The public generally pays more attention to large companies, and large companies are also more likely to attract the attention of government regulators. Therefore, larger companies have more pressure to disclose their CSR performance. In particular, the geographical and product-market segmentation of large multinational companies is more complicated than that of small companies. Large companies are more willing to disclose and improve their CSR to comply with legitimacy and enhance their corporate reputation (Haniffa & Cooke, 2005).

Industry and year (INDUSTRY and YEAR)

Strictly regulated industries such as mining, chemicals, and coal are more likely to disclose CSR performance, as doing so is required by regulatory authorities. In China, the government has introduced SCVPS as a measurement indicator to help listed companies disclose their CSR performance. Several studies consider the industry and time-fixed effects on CSR performance (Cai et al., 2012; Jo & Na, 2012). This study employs the six industry sectors in the Industry Classification Standard by the SSE: finance, utilities, real estate, conglomerates, industrials, and commerce (no company belongs to the conglomerates industry sector). Table 2 summarises all the variables employed in the analysis.

Table 2. Summary of variables

Variables		*Abbreviations*	*Definitions*	*Sources*
Dependent variables (firm performance)	Tobin's Q	*TQ*	Market value/Total assets	CSMAR
	Return on assets	*ROA*	Net profit/Total assets	CSMAR
	Return on equity	*ROE*	Net profit/Total shareholders' equity	CSMAR
	Price-to-book ratio	*PB*	Market price per share/Net asset per share	CSMAR
Explanatory variables	Current SCVPS	*SCVPS*	EPS + [(tax payment + employee expense + interest expense + total input in public good undertaking – social cost)/Total number of shares at the end of the fiscal year]	CSMAR
	SCVPS modified by accrual basis	*SCVPS_AC*	(Net profit + tax payment + employee expense + interest expense + donation + AEC – AddAEC)/Total number of shares at the end of fiscal year	Manual calculation
	SCVPS modified by cash basis	*SCVPS_CA*	(Operational cash inflow + tax payment + employee expense + interest expense + donation + AEC – AddAEC)/Total number of shares at the end of fiscal year	Manual calculation
	Audited environmental cost	*AEC*	Revenue × estimated AEC factor × regional factor × industry factor	Manual calculation
	Additional audited environmental cost	*AddAEC*	Revenue × estimated AddAEC factor × regional factor × industry factor	Manual calculation
Control variables	Firm size	*SIZE*	Natural logarithm of year-ended total assets	CSMAR
	Year (fixed effect)	*YEAR*	Year	CSMAR
	Industry (fixed effect)	*INDUSTRY*	Industry type identified by the SSE	CSMAR

4. EMPIRICAL RESULTS

4.1. Descriptive statistics

Tobin's Q is the ratio of the company's market value to the replacement cost of its assets. As shown in Table 3, its average is 1.1479, which means companies' market value is higher than their replacement cost. A higher Tobin's Q can enhance investor confidence. The average value of PB is 2.6234. It is far higher than 1, and therefore financial analysts will believe that the stock prices of these companies have the potential to grow rapidly. Consequently, investors may be more willing to invest in them. Generally, the higher the ROA and ROE are, the better the firm performance. The average values of ROA and ROE are 0.0087 and 0.1263, respectively, which are less than 1. Low ROA and ROE may indicate that asset utilisation is not efficient. It is worth noting that the current SCVPS average is 29.5272, which is high. Its standard deviation is also high, at 370.8265. A high standard deviation proves that there is considerable volatility, which may be related to its maximum value of 5416.0000. In contrast, the standard deviation of *SCVPS_AC* and *SCVPS_CA* is 2.7759 and 8.0637, respectively. The volatility of the two modified SCVPSs is far less than that of the current SCVPS.

Table 3. Descriptive statistics

Variables	*Number of observations*	*Mean*	*Median*	*Maximum*	*Minimum*	*Standard deviation*	*Skewness*	*Kurtosis*
TQ	880	1.1479	0.6874	9.3979	0.0440	1.2465	2.2436	9.6853
ROA	891	0.0087	0.0083	0.0748	–0.0265	0.0082	2.7360	25.5147
ROE	890	0.1263	0.1242	0.4328	–1.1807	0.0959	–4.6337	57.7477
PB	876	2.6234	2.0137	30.9503	0.3070	2.2635	4.0484	36.2288
SCVPS	213	29.5272	3.3000	5416.0000	0.7300	370.8256	14.4904	210.9827
LN_AEC	891	8.2627	8.2254	13.0180	2.7068	1.9280	0.0223	2.6406
LN_AddAEC	891	10.8585	10.7676	15.2881	5.8363	1.7916	0.1065	2.5906
SCVPS_AC	265	3.3993	2.5167	18.8388	0.4727	2.7759	2.3131	9.3171
SCVPS_CA	238	6.2323	3.8975	52.9888	–1.8228	8.0637	3.6000	17.3985
LN_SIZE	891	24.4145	23.9801	29.8856	20.0583	2.0608	0.6536	2.9333

Note: For the definitions of various variables, please refer to Table 2.

4.2. Multicollinearity

Table 4 presents the correlations between every pair of the variables examined. It allows the possibility of multicollinearity occurring to be evaluated before regressions are run. The simple correlation coefficients between *LN_AEC* and *LN_AddAEC* and between *SCVPS_AC* and *SCVPS_CA* are 0.9981 and 0.8319, respectively, which indicates severe multicollinearity between them. It is reasonable that they are collinear, as their elements in the calculation are very similar. Anyway, we do not consider them as explanatory variables simultaneously in a single regression model.

Table 4. Pearson correlations

	Dependent variables				***Explanatory variables***					***Control variable***
	TQ	*ROA*	*ROE*	*PB*	*SCVPS*	*LN_AEC*	*LN_AddAEC*	*SCVPS_AC*	*SCVPS_CA*	*LN_SIZE*
TQ	1.0000									
ROA	0.6080	1.0000								
ROE	0.1815	0.6311	1.0000							
PB	0.8844	0.3813	–0.1894	1.0000						
SCVPS	–0.0579	–0.1036	–0.1674	0.0162	1.0000					
LN_AEC	–0.6240	–0.2228	0.1013	–0.5618	0.0280	1.0000				
LN_AddAEC	–0.6189	–0.2194	0.1090	–0.5579	0.0375	0.9981	1.0000			
SCVPS_AC	–0.3103	–0.1051	0.4226	–0.2427	–0.0908	0.3819	0.3759	1.0000		
SCVPS_CA	–0.2987	–0.2206	0.1862	–0.2222	0.0672	0.2761	0.2683	0.8319	1.0000	
LN_SIZE	–0.7212	–0.5388	0.0484	–0.5794	0.0690	0.7835	0.7833	0.5466	0.4618	1.0000

Note: For the definitions of various variables, please refer to Table 2.

4.3. Pooled least squares regressions on firm performance using the whole sample

Shown in Table 5 are the results of pooled least squares regressions on firm performance against five explanatory variables, namely *SCVPS, SCVPS_AC, SCVPS_CA, LN_AEC,* and *LN_AddAEC*, for 81 stocks listed in the SSE SRI from 2008 to 2018. The four measures of firm performance are TQ, ROA, ROE, and PB.

Table 5. Pooled least squares regressions on firm performance using the whole sample (Panel A)

Dependent variable (TQ)	***Regression***				
	1	***2***	***3***	***4***	***5***
SCVPS(+)	–0.0000				
	(0.0000)				
SCVPS_AC(+)		0.0953***			
		(0.0189)			
SCVPS_CA(+)			0.0184***		
			(0.0052)		
LN_AEC(+)				0.0068	
				(0.0247)	
LN_AddAEC(+)					–0.0080
					(0.0271)
LN_SIZE	–0.2770***	–0.4163***	–0.4144***	–0.3714***	–0.3602***
	(0.0262)	(0.0386)	(0.0406)	(0.0235)	(0.0225)
Constant	7.8923***	11.1944***	11.3240***	10.1641***	10.0319***
	(0.7038)	(0.9691)	(1.0376)	(0.4861)	(0.4484)
INDUSTRY	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE
N	209	262	235	880	880
Adj. R^2	0.4038	0.4982	0.4711	0.3679	0.3679
F	95.1424***	174.0508***	140.2323***	342.2134***	342.2207***

Table 5. Pooled least squares regressions on firm performance using the whole sample (Panel B)

Dependent variable (ROA)	*Regression*				
	1	*2*	*3*	*4*	*5*
SCVPS(+)	–0.0000***				
	(0.0000)				
SCVPS_AC(+)		0.0043***			
		(0.0008)			
SCVPS_CA(+)			0.0005**		
			(0.0002)		
LN_AEC(+)				0.0091***	
				(0.0011)	
LN_AddAEC(+)					0.0090***
					(0.0012)
LN_SIZE	–0.0087***	–0.0138***	–0.0117***	–0.0163***	–0.0158***
	(0.0010)	(0.0008)	(0.0009)	(0.0009)	(0.0009)
Constant	0.2693***	0.3845***	0.3432***	0.3738***	0.3387***
	(0.0275)	(0.0207)	(0.0227)	(0.0168)	(0.0153)
INDUSTRY	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE
N	213	265	238	891	891
Adj. R^2	0.1887	0.4538	0.3427	0.2163	0.2088
F	33.9481***	147.4781***	83.5335***	164.8380***	157.6776***

Table 5. Pooled least squares regressions on firm performance using the whole sample (Panel C)

Dependent variable (ROE)	*Regression*				
	1	*2*	*3*	*4*	*5*
SCVPS(+)	–0.0000***				
	(0.0000)				
SCVPS_AC(+)		0.0112***			
		(0.0021)			
SCVPS_CA(+)			0.0018***		
			(0.0004)		
LN_AEC(+)				0.0083***	
				(0.0031)	
LN_AddAEC(+)					0.0084***
					(0.0031)
LN_SIZE	0.0043**	–0.0080***	–0.0043***	–0.0044**	–0.0040*
	(0.0017)	(0.0017)	(0.0016)	(0.0021)	(0.0022)
Constant	0.0298	0.3038***	0.2339***	0.1641***	0.1329***
	(0.0464)	(0.0391)	(0.0404)	(0.0418)	(0.0435)
INDUSTRY	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE
N	213	265	238	890	890
Adj. R^2	0.0275	0.1550	0.0304	0.0087	0.0075
F	5.0062***	33.3542***	5.9696***	6.2027***	5.5050***

Table 5. Pooled least squares regressions on firm performance using the whole sample (Panel D)

Dependent variable (PB)	*Regression*				
	1	*2*	*3*	*4*	*5*
SCVPS(+)	0.0002***				
	(0.0000)				
SCVPS_AC(+)		0.1163***			
		(0.0264)			
SCVPS_CA(+)			0.0300***		
			(0.0082)		
LN_AEC(+)				–0.1868***	
				(0.0577)	
LN_AddAEC(+)					–0.1799***
					(0.0587)
LN_SIZE	–0.4101***	–0.5186***	–0.5348***	–0.3650***	–0.3794***
	(0.0482)	(0.0533)	(0.0559	(0.0426)	(0.0420)
Constant	12.5658***	15.0287***	15.5796***	13.0876***	13.8506***
	(1.2953)	(1.3357)	(1.4268)	(0.8933)	(0.9076)
INDUSTRY	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE
N	209	262	235	876	876
Adj. R^2	0.2804	0.3698	0.3572	0.2229	0.2213
F	55.1551***	103.2903***	87.8645***	168.4503***	166.8792***

Notes:
1) The table reports the results of the industry and year fixed-effects pooled least squares regressions on various firm performance measures, TQ, ROA, ROE, and PB, against different explanatory variables, SCVPS, SCVPS_AC, SCVPS_CA, LN_AEC, and LN_AddAEC.
2) For the definitions of various variables, please refer to Table 2.
3) Robust standard errors are reported in parenthesis. FE indicates for fixed effect. N is the number of observations, Adj. R^2 is the adjusted R-squared, and F is the F-statistic.
*4) ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively.*

In Panel A, the current SCVPS in regression 1 is not significantly related to TQ. Although *LN_AEC* and *LN_AddAEC* are not statistically significant in explaining TQ in regressions 4 and 5, *SCVPS_AC* and *SCVPS_CA* have a significant and positive relationship with TQ at the 1% level. The results indicate that the company's environmental contributions (i.e., audited environmental cost and additional audited environmental cost) may not have a direct relationship with its firm performance. However, after taking environmental contributions into account, the two modified SCVPSs have a positive impact on the firm's performance. Therefore, to improve the firm's performance, companies are encouraged to disclose their CSR performance by using the two modified SCVPSs instead of the current SCVPS.

In Panel B, both AEC and AddAEC are significantly and positively related to ROA at the 1% level in regressions 4 and 5. *SCVPS_AC* and *SCVPS_CA* also have a significant and positive relationship with ROA at the 1% and 5% significance levels in regressions 2 and 3 respectively. Although the current SCVPS is statistically significant in regression 1, its coefficient estimate has an unexpected sign. ROA represents the company's asset utilisation rate. After the company strengthened its environmental contribution by investing in environmentally-friendly equipment, it increased its asset utilisation. Therefore, *SCVPS_AC* and *SCVPS_CA*, as well as AEC and AddAEC, have a positive impact on ROA. The current SCVPS has a significantly negative effect on ROA. All the results show that the two modified SCVPSs are more attractive than the current SCVPS to companies disclosing their CSR performance.

Regarding ROE in Panel C, all five explanatory variables are highly significant in the regressions at the 1% level. The coefficient estimates of the two modified SCVPSs, *SCPVS_AC* and *SCVPS_CA*, and the two environmental contributions, *LN_AEC* and *LN_AddAEC*, are positive as well. These results are in line with our expectations. Conversely, although the coefficient estimate of the current SCVPS is significant, it is negative. These imply that, in terms of ROE, the current SCVPS has a negative impact on the firm's performance, whereas *SCPVS_AC* and *SCVPS_CA* have a positive impact on the firm's performance. Undoubtedly, the two modified SCVPSs are more attractive to both shareholders and investors.

In Panel D, both *SCVPS_AC* and *SCVPS_CA* are also found to have a significant and positive impact on PB. In regressions 2 and 3, the coefficient estimates of these two explanatory variables are significantly different from zero at the 1% level and have a positive sign. Different from the other three measures of firm performance, the current SCVPS can significantly and negatively explain PB. Although the coefficient estimates of AEC and AddAEC have a negative sign, it is reasonable to conjecture that companies with high growth capabilities generally belong to emerging industries, and investors hope that firms in these industries can invest more in productivity and profitability. Financial analysts do not see these emerging firms paying as much attention to their environmental contribution as their operational capabilities in the early stages of development. Therefore, the higher environmental contribution may cause a lower PB. Regardless, the coefficient estimates of *SCVPS_AC* and *SCVPS_CA*, 0.1163 and 0.0300, are larger than that of SCVPS, 0.0002, and it is better for companies to use the two modified SCVPSs instead of the current SCVPS to reflect their firm performance in terms of PB.

In summary, although the relationships between the two environmental contributions, AEC and AddAEC, and firm performance are not consistently statistically significant and positive, the two modified SCVPSs, under the accrual basis and the cash basis, show that they are consistently significant and positive across the four panels. These findings are in line with our expectation that the two modified SCVPSs outperform the current SCVPS in measuring the CSR performance — as the better the CSR is, the better the firm performance. It is worth mentioning here that regression 2 using *SCVPS_AC* consistently generates the largest explanatory power (i.e., adjusted R-squared) among the five regressions in all the panels. This may indicate that the SCVPS under the accrual basis is the best among the five measures to reflect the CSR of a company.

4.4. Robustness checks

Few studies show that government regulations and ownership structure will affect CSR performance in developing countries (Rizk, Dixon, & Woodhead, 2008). In our sample, there are 735 observations for SO firms and 156 for NSO firms. The sample size of SO firms far exceeds that of NSO firms. Indeed, there are more SO firms in the 81 selected stocks from the SSE SRI. Consequently, we aimed to further explore whether the CSR performance of SO firms is different from that of NSO firms.

In the robustness test, the whole sample was first divided into two sub-samples: SO firms and NSO firms. Pooled least squares regressions were then run using equation (2) to equation (5) on the two sub-samples separately to compare the effect of CSR performance, measured by SCVPS, *SCVPS_AC*, and *SCVPS_CA*, on the firm performance, measured by TQ, ROA, ROE, and PB individually, under different ownership structures (Table 6). For the sake of brevity, the results using the two environmental contributions are omitted, as the two modified SCVPSs were shown to perform better than them in the last section.

In Panel A, *SCVPS_AC* and *SCVPS_CA* are significantly and positively related to TQ at the 1% level for both SO and NSO firms. However, there is no significant relationship between the current SCVPS and TQ, irrespective of ownership structure. In other words, the modified SCVPSs under the accrual basis and the cash basis — rather than the current SCVPS — have a significant and positive impact on the company's market value regardless of whether the firm is SO or NSO. Furthermore, the significance of *SCVPS_AC* is stronger for SO firms (t-statistic = 4.8930) than for NSO firms (t-statistic = 3.7705).

In Panel B, *SCVPS_AC* has a significantly positive relationship with ROA for SO and NSO firms in regressions 3 and 4, respectively. *SCVPS_CA* is significantly and positively related to ROA at the 1% level for SO firms in regression 5, whereas there is no significant relationship between *SCVPS_CA* and

ROA for NSO firms in regression 6. The current SCVPS has a significant and positive relationship with ROA at the 1% level for SO firms in regression 1 but no significant relationship for NSO firms in regression 2. The above results may imply that the modified SCVPS under the accrual basis is better than that under the cash basis for reflecting CSR performance and that the current SCVPS may still have an impact on firm performance on some occasions. The impact of CSR performance, measured by SCVPS_AC, is stronger on ROA for SO firms (t-statistic = 6.0306) than NSO firms (t-statistic = 2.1870).

Table 6. Pooled least squares regressions on firm performance using SO and NSO firms separately (Panel A)

Dependent variable (TQ)	***Regression***					
	1	***2***	***3***	***4***	***5***	***6***
	SO	*NSO*	*SO*	*NSO*	*SO*	*NSO*
SCVPS(+)	0.0117	0.0001				
	(0.0107)	(0.0001)				
SCVPS_AC(+)			0.1159***	0.1321***		
			(0.0237)	(0.0350)		
SCVPS_CA(+)					0.0266***	0.0412***
					(0.0079)	(0.0129)
LN_SIZE	–0.2465***	–0.6683***	–0.3896***	–0.6688***	–0.3852***	–0.6888***
	(0.0302)	(0.0948)	(0.0469)	(0.0863)	(0.0493)	(0.0933)
Constant	7.0105***	17.8462***	10.4262***	17.2753***	10.5156***	17.8776***
	(0.7858)	(2.4118)	(1.1852)	(2.0129)	(1.2727)	(2.2020)
INDUSTRY	FE	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE	FE
N	178	31	212	50	187	48
Adj. R^2	0.3830	0.6562	0.4550	0.7072	0.4201	0.6857
F	74.4656***	39.8136***	118.7034***	80.7104***	91.0581***	70.0906***

Table 6. Pooled least squares regressions on firm performance using SO and NSO firms separately (Panel B)

Dependent variable (ROA)	***Regression***					
	1	***2***	***3***	***4***	***5***	***6***
	SO	*NSO*	*SO*	*NSO*	*SO*	*NSO*
SCVPS(+)	0.0026**	–0.0000				
	(0.0012)	(0.0000)				
SCVPS_AC(+)			0.0057***	0.0022**		
			(0.0010)	(0.0010)		
SCVPS_CA(+)					0.0012**	–0.0006
					(0.0005)	(0.0004)
LN_SIZE	–0.0088***	–0.0256***	–0.0133***	–0.0170***	–0.0112***	–0.0108***
	(0.0013)	(0.0020)	(0.0010)	(0.0022)	(0.0011)	(0.0025)
Constant	0.2566***	0.7055***	0.3640***	0.4742***	0.3244) ***	0.3373***
	(0.0326)	(0.0509)	(0.0253)	(0.0516)	(0.0287)	(0.0584)
INDUSTRY	FE	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE	FE
N	181	32	214	51	189	49
Adj. R^2	0.1495	0.8277	0.4359	0.5292	0.3051	0.5061
F	22.155***	101.9070***	110.9914***	38.8499***	56.1856***	34.1279***

Table 6. Pooled least squares regressions on firm performance using SO and NSO firms separately (Panel C)

Dependent variable (ROE)	***Regression***					
	1	***2***	***3***	***4***	***5***	***6***
	SO	*NSO*	*SO*	*NSO*	*SO*	*NSO*
SCVPS(+)	0.0072***	–0.0000***				
	(0.0018)	(0.0000)				
SCVPS_AC(+)			0.0138***	0.0057		
			(0.0019)	(0.0039)		
SCVPS_CA(+)					0.0028***	–0.0004
					(0.0008)	(0.0010)
LN_SIZE	0.0023	–0.0155***	–0.0068***	–0.0102	–0.0029	–0.0000
	(0.0022)	(0.0042)	(0.0017)	(0.0068)	(0.0018)	(0.0076)
Constant	0.0422	0.5720***	0.2624***	0.3968**	0.1876***	0.1743
	(0.0543)	(0.1080)	(0.0410)	(0.1565)	(0.0456)	(0.1749)
INDUSTRY	FE	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE	FE
N	181	32	214	51	189	49
Adj. R^2	0.1189	0.3334	0.2113	0.0205	0.0507	–0.0250
F	17.2414***	11.5008***	39.1276***	1.7060	7.7053***	0.2123

Table 6. Pooled least squares regressions on firm performance using SO and NSO firms separately (Panel D)

Dependent variable (PB)	*Regression*					
	1	*2*	*3*	*4*	*5*	*6*
	SO	*NSO*	*SO*	*NSO*	*SO*	*NSO*
SCVPS(+)	−0.0083	0.0004***				
	(0.0266)	(0.0001)				
SCVPS_AC(+)			0.1131***	0.1755**		
			(0.0341)	(0.0685)		
SCVPS_CA(+)					0.0287***	0.0486**
					(0.0101)	(0.0206)
LN_SIZE	−0.3339***	−1.0772***	−0.4774***	−0.7570***	−0.4939***	−0.7510***
	(0.0507)	(0.2254)	(0.0623)	(0.1695)	(0.0657)	(0.1536)
Constant	10.5415***	29.6501***	13.9267***	20.8600***	14.4838***	20.9290***
	(1.3031)	(5.7946)	(1.5701)	(3.9556)	(1.6905)	(3.6578)
INDUSTRY	FE	FE	FE	FE	FE	FE
YEAR	FE	FE	FE	FE	FE	FE
N	178	31	212	50	187	48
Adj. R^2	0.2674	0.4275	0.3569	0.3321	0.3475	0.2990
F	44.1906***	16.1863***	79.2419***	17.4102***	67.2022***	14.5080***

Notes:
1) The table reports the results of the industry and year fixed-effects pooled least squares regressions on various firm performance measures, TQ, ROA, ROE, and PB, against different explanatory variables, SCVPS, SCVPS_AC, and SCVPS_CA, based on two sub-samples which contain the SO and NSO firms respectively.
2) For the definitions of various variables, please refer to Table 2.
3) Robust standard errors are reported in parenthesis. FE indicates a fixed effect. N is the number of observations, Adj. R^2 is the adjusted R-squared, and F is the F-statistic.
*4) ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively.*

As mentioned earlier, ROE is somewhat like ROA. In Panel C, the coefficient estimates of *SCVPS_AC* are positive for SO and NSO firms in regressions 3 and 4, respectively. However, *SCVPS_AC* has a significant relationship with ROE for SO firms only. The relationship between *SCVPS_CA* and ROE is significantly positive at the 1% level for SO firms in regression 5 but not significant at all the conventional levels for NSO forms in regression 6. Although the current SCVPS has a significant relationship with ROE at the 1% level for both SO and NSO firms, the coefficient estimates are positive in regression 1 but negative in regression 2. Overall, the modified SCVPS under the accrual basis seems to be the best, among the current SCVPS, *SCVPS_AC*, and *SCVPS_CA*, to impact ROE. In addition, the significance of *SCVPS_AC* is stronger for SO firms (t-statistic = 7.4501) than for NSO firms (t-statistic = 1.4601).

In Panel D, *SCVPS_AC* and *SCVPS_CA* have a significant and positive relationship with PB for both SO and NSO firms. In regressions 3 and 4, the coefficient estimates of *SCVPS_AC*, associated with a positive sign, are significantly different from zero at the 1% significance level, and in regressions 5 and 6, the coefficient estimates of *SCVPS_CA* are also significant and positive. In addition, it is observed in regressions 1 and 2 that there is no significant relationship between the current SCVPS and PB for SO firms, whereas the relationship between them is significantly positive for NSO firms. Not surprisingly, the significance of *SCVPS_AC* is stronger for SO firms (t-statistic = 3.3118) than for NSO firms (t-statistic = 2.5620).

Overall, the two modified SCVPSs are better than the current SCVPS to measure CSR performance in China. Furthermore, the results for the two modified SCVPSs are relatively unaffected by the different ownership structures, SO and NSO. They have a significantly positive impact on different firm performance measures regardless of whether the firms are SO or NSO. In keeping with our expectations, we find evidence that the influence of the modified SCVPS under the accrual basis on firm performance is more significant for SO firms than NSO firms. The SO firms have direct supervision, guidance, and resources from the Chinese government, and therefore these firms should implement the CSR-related policy more strictly and decisively so that the benefits of doing so will be absorbed thoroughly when compared with NSO firms.

5. CONCLUSION

By comparing the components in the formula of the current SCVPS with the TBL framework, this study finds that the current SCVPS lacks the measurement of environmental contribution. We use the concepts of AEC and AddAEC introduced by Xu and Zhu (2010) to estimate the company's environmental contributions and then modify the current SCVPS formula by adding environmentally friendly components. Two different modified SCVPSs, namely, *SCVPS_AC* and *SCVPS_CA*, are constructed by using two accounting recognition bases, namely, the accrual basis and the cash basis. The modified SCVPSs can compensate for the lack of environmental contributions in the process of disclosing CSR performance.

The sample employed is 81 listed stocks in the SSE SRI for 11 consecutive years, from 2008 to 2018. Pooled least-squares regressions are used to explore any relationships between the current SCVPS, *SCVPS_AC*, *SCVPS_CA*, AEC, and AddAEC and four selected firm performance measures, namely, TQ, ROA, ROE, and PB. The results show that AEC and AddAEC can positively influence ROA and ROE directly but have no positive relationship with TQ and PB. The current SCVPS has a significantly positive effect on PB only, whereas positive relationships between the two modified SCVPSs and the four-firm performance measures exist in China. We find that the coefficient estimates of *SCVPS_AC* and *SCVPS_CA* are consistently and significantly positive in all the regressions conducted. In addition,

we find that, based on the explanatory power (i.e., adjusted R-squared), SCVPS under the accrual basis is even better than under the cash basis in estimating the CSR of companies.

State ownership is a unique characteristic in China, and the ownership structure will affect CSR performance in developing countries. We also investigate whether the CSR performance of SO firms is different from that of NSO firms. The evidence indicates that the two modified SCVPSs continue to outperform the current SCVPS to estimate CSR performance in both SO and NSO firms. Additionally, SCVPS under the accrual basis is better than SCVPS under the cash basis in estimating CSR. There is further evidence to indicate that the significance of the modified SCVPS under the accrual basis on the firm performance is stronger for SO firms than NSO firms. SO firms can receive more resources, guidance, and supervision and, therefore, can absorb the benefits of CSR better than NSO firms.

In comparing the two modified SCVPSs with the current SCVPS, we take the environmentally friendly components into account by adding the estimated audited environmental costs as well as the additional audited environmental costs to the original SCVPS formula; the current SCVPS does not consider the influence of environmental contributions on firm performance. If companies choose not to invest in environmentally friendly projects, then they will lose a chance of being sustainable in the long term, due to the current promotion in the society of being "green". Hence, this study attempts to extend the completeness of CSR performance measurement by introducing the concept of environmental contributions. The strong significance of the modified SCVPSs on firm performance will encourage firms to improve their environmental contributions. As such, companies have the incentive to treat all stakeholders fairly and pursue such environmental contributions to make them sustainable in the long run.

This study has several limitations that can be further investigated in future research. The estimation of audited environmental cost and additional audited environmental cost is still highly complicated, which may lead to biases in research results. There is still much room for improvement in the method of assessing environmental contributions. Furthermore, the sample is relatively small, only including 81 of the top 100 stocks listed in the SSE SRI. In future investigations, the sample could include all the listed companies in China. Finally, the concept of SCVPS may only be practical in China at present. The SCVPS formula could be modified so that it could be applied in other developing and even developed countries.

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