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Corporate social responsibility and income smoothing: Supply chain perspectives☆

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ABSTRACT

This paper investigates how the supplier-buyer relationship affects the income-smoothing behavior of socially responsible companies. Prior research finds that companies tend to smooth earnings to maintain the supply chain relationship. This paper argues that the income-smoothing behavior of socially responsible companies is conditioned on how their supply chain partners treat corporate social responsibility (CSR). The findings show that companies engaging in higher levels of CSR performance who have greater dependence on the supplier-buyer relationship are associated with lower levels of income smoothness. In addition, this paper finds that the capital market perceives the smoothed earnings of firms with superior CSR performance to be less informative than the earnings of other firms, implying that faithful representation is consistent with the interests of both shareholders and stakeholders. Collectively, the findings suggest that the growing CSR demand in the supply chain is in line with the interests of shareholders and stakeholders.

1. Introduction

Corporate social responsibility (hereafter, CSR) is gaining in importance in the areas of supply chain management and managerial income smoothing behavior. Increasing numbers of companies are placing orders to suppliers who incorporate CSR into their products. For instance, Apple Inc., a big U.S. publicly held technology company, launched a new initiative in 2005 to drive its suppliers to become more energy efficient and to use clean energy for their manufacturing operations.[1] This trend not only embraces firm efforts to keep a balance between profits and environmental sustainability, but it also somewhat signifies their demand-oriented CSR policy in contemporary society. Because expenditures on CSR eventually flow into product costs, firms may not increase investments in CSR projects unless their supply chain partners change their focus from cost-oriented products to green products. This phenomenon implies that the supply chain relationship is potentially a major determinant of a firm's CSR policy.

Income smoothing is a managerial behavior where managers use their reporting discretion to dampen fluctuations in their firm's net income (Trueman & Titman, 1988). There are two alternative arguments regarding income smoothing behavior. On the one hand, income smoothing improves earnings informativeness if managers attempt to communicate their assessment of future earnings to the market (Tucker & Zarowin, 2006). On the other hand, income smoothing results in biased earnings if managers attempt to distort net income (Grant, Markarian, & Parbonetti, 2009; Kirschenheiter & Melumad, 2002; Lambert, 1984; Myers, Myers, & Swaminathan, 2007). This inconsistency remains even in current studies that focus on socially responsible firms (hereafter, CSR firms). Gao and Zhang (2015) find that U.S. income-smoothing firms placing more emphasis on CSR exhibit a higher contemporaneous earnings-return relationship. Based on international data, Chih, Shen, and Kang (2008) find that CSR firms exhibit higher levels of earnings aggressiveness but lower levels of income smoothness and earnings loss avoidance. Based on a sample of U.S. firms, Kim, Park, and Wier (2012) find that CSR firms are less likely to manipulate discretionary accruals and actual operating activities and

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[1] See http://www.apple.com/pr/library/2015/10/22Apple-Launches-New-Clean-Energy-Programs-in-China-To-Promote-Low-Carbon-Manufacturing-and-Green-Growth.html.

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are thus subject to SEC investigations. Kim et al. (2012) suggest that the findings in Chih et al. (2008) may have been driven by country differences, while Kim et al. (2012) do not examine income smoothing behavior. Given the fact that income smoothing results in very different earnings patterns from those in other earnings management schemes, it is important to examine the ambiguous effect of CSR on managerial income smoothing behavior. We fill this gap by examining the income smoothing of CSR firms from the perspective of the supply chain.

The purpose of this study is to investigate how the supplier-buyer relationship affects the income-smoothing behavior of CSR firms. Under the transaction cost theory, firms seek to minimize the costs of negotiating, enforcing, and monitoring a contingent claims contract (Hill, 1990; Jones & Hill, 1988). Prior research also finds that firms smooth earnings in order to maintain the supply chain relationship (e.g., Dou, Hope, & Thomas, 2013). We argue that firms' income-smoothing behavior depends on how their supply chain partners treat CSR. Firms may not engage in more CSR such as green production or reduce income smoothing unless their supply chain partners shed more light on CSR than on earnings. We hypothesize that greater dependence on the supply chain relationship motivates socially responsible firms to reduce income smoothing. To test this hypothesis, we use two alternative measures of the industry-level supplier-customer relationship and two alternative measures of income smoothness for robustness. We also examine how the market perceives the income-smoothing behavior of firms with good CSR performance. To polish the conclusion, we conduct additional analyses, which include an analysis using a lag model, analyses of spurious correlations and potential endogeneity, assessment of the accounting informativeness of CSR firms' income smoothing behavior, as well as other robustness checks.

Based on a sample of U.S. companies during the period 1991–2013, we evidence the functional role of the supplier-buyer relationship in the income smoothing behavior of socially responsible firms. First of all, we find a negative relation between CSR and income smoothing, suggesting that there is a tradeoff between CSR and income smoothing for U.S. companies. Secondly, we find that CSR firms having greater dependence on supply chain are associated with lower levels of income smoothness, suggesting that companies' CSR-income smoothing tradeoff is conditioned on the level of supply chain dependence. The findings remain qualitatively similar once additional concerns such as potential spurious correlations and endogeneity have been considered. Finally, we find that the capital market perceives the smoothed earnings of firms with superior CSR performance and high dependence on the supplier-buyer relationship to be less informative than other firms, which is consistent with the view that true but volatile earnings are better than reporting artificially smoothed earnings (Ball, 2006; Dichev & Tang, 2009).

This paper contributes to the literature in several ways. First, this paper adds to the stakeholder theory by highlighting the importance of a company's CSR activities to the stakeholders' decision in the supply chain in addition to accounting numbers. The findings suggest that benevolent activities are the major determinant in the maintenance of the supplier-buyer relationship in addition to earnings stability, but how supply chain partners treat CSR as well as earnings numbers depends on the level of supply chain dependence. Likewise, it is also found that the capital market disciplines CSR firms' income smoothing behavior. Collectively, companies' attention to benevolent activities and faithful representation are in line with the benefits of stakeholders. Secondly, this paper contributes to Dou et al. (2013) and Chih et al. (2008) in several ways. Using the data from 39 countries during the period of 1992–2004, Dou et al. (2013) document that companies in countries where enforceability of explicit contracts is particularly weak tend to signal their willingness to maintain long-term relationships by using earnings smoothing, which is informational in the presence of incomplete contracts. They also find an insignificant relation between earnings smoothing and relationship-specificity within the firms in the U.S., a country with strong legal enforcement. Based on the data from 46 countries during the period 1993–2002, Chih et al. (2008) find that firms with a greater commitment to CSR have lower levels of earnings smoothing. Our study is based on a sample of CSR firms in the U.S., a country with strong legal enforcement. Focusing only on a single country allows us to reduce confounding effects and to do an in-depth analysis with large sample size. In contrast with Dou et al. (2013), we find that income smoothing behavior in U.S. firms is associated with their dependence on the supply chain. We add to Chih et al. (2008) by further documenting that the relation between a firm's commitment to CSR and earnings smoothing behavior is conditioned on its supply chain dependence. However, we also document that the smoothed earnings of U.S. CSR firms are not as informative as their non-CSR counterparts. Thirdly, this paper adds to the debate with respect to the nature of income smoothing by showing that, when paying more attention to the supply chain relationship, firms making greater efforts to engage in CSR are less likely to smooth earnings. This implies that stakeholder attitudes toward firm CSR policies affect the income-smoothing behavior of such firms. Thirdly, this paper adds to the debate with respect to the nature of income smoothing by suggesting that a firm's CSR policy and its income-smoothing behavior is subject to the stakeholders' attitude toward CSR in the industry. Finally, the finding regarding the capital market's perception of CSR firms' income soothing behavior suggests that investors may not necessarily prefer smoothed earnings. Thus, faithful representation is consistent with the interests of both shareholders and stakeholders.

The rest of this paper is organized as follows: The next section reviews the related literature and develops the hypotheses. The third section introduces the research design and data sources. The fourth section describes the empirical findings, and the conclusions are drawn in the fifth section.

2. Literature review and hypotheses development

2.1. Literature on income smoothing

Income smoothing is attractive to some managers because it reduces abnormal earnings variations in the scope of accounting standards (Beidleman, 1973; Graham, Harvey, & Rajgopal, 2005). Such managers are motivated by both self-interest and non-self-interest purposes. To secure their jobs, managers inflate earnings when current earnings are poor and reserve earnings when current earnings are good (Defond & Park, 1997). Managers who are contracted with compensation plans smooth earnings to lower risk exposure (Grant et al., 2009; Moses, 1987). Managers may also dampen earnings fluctuations to maintain a long-term supplier-buyer relationship. For example, based on a sample of firms from thirty-nine countries, Dou et al. (2013) find that firms located in countries with weak legal systems and those in industries with a strong demand for relationship-specific investments tend to smooth earnings in order to signal their willingness to fulfill implicit claims and maintain long-term relationships with their partners.

The consequences of income smoothing are unclear. Some scholars hold a positive view of income smoothing behavior. In their study, Dou et al. (2013) also find that the smoothed earnings arising from managerial attempts to maintain long-term supplier-buyer relationships are driven by the informational component of income smoothing. Wang and Williams (1994) and Subramanyam (1996) find that income smoothing strengthens earnings persistence and the predictability of earnings and dividends. Hunt, Moyer, and Shevlin (2000) find that lower earnings volatility arising from income smoothing is associated with higher market value of equity. Similarly, Sankar and Subramanyam (2001) provide a theoretical model showing that investors attach weight to smoothed earnings. Other scholars hold a passive view on income smoothing behavior. They argue and document that managers exploit private information from income smoothing to achieve earnings targets, to avoid earnings disappointment, or to increase credit ratings, which affect investors' investment decisions and

jeopardize shareholder wealth in the long run (Jung & Yang, 2013; Kirschenheiter & Melumad, 2002; Myers et al., 2007). Several empirical studies indicate that the capital market controls income smoothing behavior in the form of high transaction costs and low liquidity, high cost of equity, few follower analysts, and low institutional shareholdings (Bhattacharya, Korschun, & Sen, 2009; Dey, 2004; Lafond, Lang, & Skaife, 2007; Lang, Lins, & Maffett, 2012; Lang & Maffett, 2011).

2.2. Literature on corporate social responsibility

Although CSR is gaining importance in the global community,[2] there is no common definition.[3] Many scholars follow McWilliams and Siegel (2001), who define CSR as "situations where the firm goes beyond compliance and engages in actions that appear to further some social good, beyond the interests of the firm and that which is required by law."

Some studies focus on companies' commitments to CSR from the perspective of the stakeholder theory (e.g., Bhattacharya et al., 2009; Donaldson & Preston, 1995; McWilliams & Siegel, 2001; McWilliams, Siegel, & Wright, 2006; Roberts, 1992; Ullmann, 1985). Such studies agree that CSR performance reflects mangers' incentives related to management of stakeholder relationships because commitment to CSR can benefit relationships between companies and stakeholders. McKinsey (2010) further confirms managerial attempts at maintaining stakeholder relationships through CSR. According to their survey, McKinsey (2010) find that managers who serve both business-to-business (B2B) and business-to-consumer (B2C) audiences agree that good CSR performance substantially facilitates both market entry and the recruitment of talented personnel.

Several studies further agree that CSR efforts with regard to local education, environmental protection, or employee healthcare activities create reputational capital that is similar to advertising (Doney & Cannon, 1997; Fombrun, Gardberg, & Barnett, 2000; Godfrey, Merrill, & Hansem, 2005; Klein & Leffler, 1981; Milgrom & Robert, 1986; Rogerson, 1983). For instance, Doney and Cannon (1997) provide some evidence that suppliers' attention to benevolence increases the likelihood that buyers will anticipate doing business with them. Godfrey et al. (2005) find that CSR activities create a positive image and reputation that temper stakeholders' negative judgments and sanctions toward firms. Deng, Kang, and Low (2013) argue that a firm's reputation for fulfilling implicit and existing contracts with relevant stakeholders are crucial to the success of mergers. They find that acquirers' CSR efforts are a key factor related to merger performance that contribute to long-term post-merger operating performance. Some studies find CSR to be beneficial to leadership (Waldman, Siegel, & Javidan, 2006), employee recruitment (Turban & Greening, 1996), less informed trading by insiders (Gao, Lisic, & Zhang, 2014), and greater customer satisfaction and loyalty (e.g., Brown & Dacin, 1997; Homburg, Stierl, & Bornemann, 2013; Luo & Bhattacharya, 2006). Collectively, CSR is an important element that reinforces stakeholder relationships (e.g., Bhattacharya et al., 2009; Clarkson, 1995; Waddock & Smith, 2000).

2.3. Corporate social responsibility, the supplier-buyer relationship, and income smoothing

Under the transaction cost theory, firms seek to minimize external transaction costs related to producing and distributing products[4] as well as internal bureaucratic costs arising from information distortion[5] (Coase, 1937; Hui, Klasa, & Yeung, 2012; Williamson, 1981). Given that internal bureaucratic costs are inevitable, firms have to stabilize the supply chain in order to receive or provide cheap, reliable supplies of products and materials. Thus, those pursuing a close relationship with their supply chain partners may have strong incentives to smooth earnings (Dou et al., 2013). Companies do this because they believe that the users of financial reporting perceive smoothed earnings to be less risky than bumpy earnings (Graham, Harvey, & Rajgopal, 2006).

Socially responsible firms yet may have different patterns of income smoothing behavior. Based on an international sample including U.S. firms, Chih et al. (2008) find that CSR firms exhibit higher levels of earnings aggressiveness but lower levels of income smoothing and earnings loss avoidance. Kim et al. (2012) suggest that the findings in Chih et al. (2008) could arise from country differences rather than differences in CSR activities. Kim et al. (2012) find that U.S. firms conducting CSR activities are less likely to engage in accrual-based and real-based earnings management, but they do not examine the income smoothing behavior of CSR firms. Although there appears to be a lack of evidence on CSR firms' income smoothing behavior in the U.S., studies on U.S. firms imply a negative relation between CSR and income smoothing. A possible explanation for this negative relation could be that the benefits from being socially responsible motivate firms to reduce income smoothing. Recent research on CSR argues that firms can build reputational capital from CSR activities (e.g. Bertels & Peloza, 2008; Du, Bhattacharya, & Sen, 2010; Fombrun, 2005; Fombrun et al., 2000; Kim, 2014; Lii & Lee, 2012; Minor & Morgan, 2011; Siltaoja, 2006). For instance, Fombrun et al. (2000) argue that the reputational gains from CSR activities improve the ability of socially responsible firms to attract contracts with suppliers and governments, thus enhancing performance and building competitive advantage. Minor and Morgan (2011) argue that CSR activities provide partial self-insurance for firms to guard against reputation risk. Consistent with their argument, Minor and Morgan (2011) find that declines in the reputation of CSR firms following product recalls is less than those of non-CSR firms. Kim (2014) further finds that CSR reputation mitigates the negative impact of product-harm crises where products are found to pose a danger to consumers.

How CSR activities affect a firm's smoothing behavior might be conditioned on the relative importance of CSR and financial performance in the supply chain. It is found that managers consider other firms' actions when making their own decisions, which is called the herding effect or social learning (Arya & Mittendorf, 2005; Bikhchandani, Hirshleifer, & Welch, 1998; Tse & Tucker, 2010). The herding effect motivates firms in the supply chain to mimic the actions of their supply chain partners whether those actions are eco-friendly or not because mimicking the actions of their partners is less risky under uncertainty. In the case where CSR is not popular in the supply chain and given that the source is limited, companies with high dependence on the supply chain might not have incentives to conduct benevolent activities when they are making a trading-off between CSR and income smoothing. In such cases, we expect that the level of supply chain dependence will not significantly affect firm CSR policy or earnings smoothing behavior. If supply chain partners place a relatively high importance on CSR, companies in an environment where supply chain dependence is high might have a greater incentive to conduct benevolent activities when they are making a trading-off between CSR and income smoothing. In such cases, we expect that greater supply chain

[2] Practitioners commonly agree with the importance of CSR. A survey by KPMG (2013) indicates that over 90% of world's largest 250 firms regularly issue stand-alone reports to publicize their CSR efforts.

[3] McKinsey's survey found that 55% of executive respondents consider CSR as directed toward issues related to the environment, and 48% of them link CSR to corporate governance (McKinsey 2010). Moreover, 56% of respondents define CSR in more than one way.

[4] Examples of external transaction costs include bounded rationality, opportunism, risks, core company assets, and environmental uncertainty.

[5] Examples of internal bureaucratic costs include a lack of incentive to reduce operating costs and a lack of strategic flexibility in times of changing technology.

dependence will motivate socially responsible firms to reduce income smoothing. Accordingly, we develop the following hypothesis:

Hypothesis: Ceteris paribus, greater supply chain dependence motivates socially responsible firms to reduce income smoothing.

3. Research design

3.1. Two alternative measures of supplier-customer relationship

We use two alternative measures of the supplier-buyer relationship. The first measure captures the importance of relationship-specific investments across industries, following Nunn (2007). Using data from Rauch (1999),[6] we classify the inputs into three liberal categories: those traded on organized exchanges, those not traded on organized exchanges but having reference prices, and all other inputs at the four-digit level of the Standard International Trade Classification (SITC) Rev. 2 system. We match each SITC industry to an Input-Output (IO) industry listed in the Bureau of Economic Analysis Input–Output Tables in terms of the concordance constructed by Nunn (2007).[7] For each final good, we then construct a measure of the proportion of intermediate inputs that are relationship-specific, expressed by Eq. (1). Firms in an industry where *RS_INPUT* in Eq. (1) is high are assumed to intensively use inputs requiring relationship-specific investments. We then match the *RS_INPUT* data with financial data based on the four-digit Standard Industrial Classification (SIC) codes according to the IO-SIC codes conversion table used by Fan and Lang (2000).

$$RS\_INPUT_r = \sum_s \theta_{rs} R_s^{Other}, \tag{1}$$

where $\theta_{rs} \equiv u_{rs}/u_r$, and u_{rs} is the value of input s used in industry r; u_r is the total value of all inputs used in industry r. R_s^{other} is the proportion of input s that is neither sold on an organized exchange nor reference priced.

The second measure of the supplier-buyer relationship captures firm dependence on the research and development (R&D) projects of their supplier and customer industries. We follow the estimation procedure in Raman and Shahrur (2008).[8] First, we identify the supplier and customer industries according to the *Use* table of the benchmark Input-Output (IO) accounts provided by the Bureau of Economic Analysis. For any pair of supplier and customer industries, the IO *Use* table accounts report the estimated value of a supplier industry's output that is used as input in the production of the customer industry's output. We then use the firm's IO code to identify its supplier and customer industries from the *Use* table. Because the Bureau of Economic Analysis provides the IO accounts every five years, we employ the 1992, 1997, 2002, 2007, and 2012 *Use* tables for the periods 1991 to 1994, 1995 to 1999, 2000 to 2004, 2005 to 2009, and 2010 to 2013, respectively. In addition, because the Bureau of Economic Analysis replaced the SIC coding system with the North American Industry Classification System (NAICS) in the *Use* table after the year 1997, for consistency, we convert the NAICS data into four-digit SIC codes based on the NAICS-SIC Cross-Reference table provided by the U.S. Department of Labor.[9] We then merge the data with financial data based on the four-digit SIC code. Following a prior study (e.g., Bowen, Ducharme, & Shores, 1995), we set missing values on R&D expenses equal to zero. We compute the R&D intensity of each industry as the sum of the R&D expenses of all firms in the industry divided by the sum of total assets of all firms in the industry. We then measure the weighted R&D intensities of supplier and customer industries according to Eqs. (2A) and (2B), respectively. Firms with high values for *RS_SUPPLIER* or *RS_CUSTOMER* in Eqs. (2A) or (2B) represent high R&D dependence on their suppliers or customers, and thus reflect a high supplier-buyer relationship.

$$RS\_SUPPLIER = \sum_{\substack{s=1 \\ s\neq r}}^{n} SupplierIndustryR\&D_s * IndustryInputCoefficient_{sr} \tag{2A}$$

$$RS\_CUSTOMER = \sum_{\substack{s=1 \\ s\neq r}}^{n} CustomerIndustryR\&D_s * IndustryPercentageSold_{sr} \tag{2B}$$

where n is the number of supplier (customer) industries. *RS_SUPPLIER* refers to the weighted R&D intensities of the supplier industry. *RS_CUSTOMER* refers to the weighted R&D intensities of the customer industry. $SupplierIndustryR\&D_s$ refers to the ratio of R&D to total assets for the sth supplier industry. $CustomerIndustryR\&D_s$ refers to the ratio of R&D to total assets for the sth customer industry. $IndustryInputCoefficient_{sr}$ refers to the dollar amount of the sth supplier industry's output used as input to produce one dollar of output for the rth industry. The total output of the rth industry is computed by adding the purchases from all supplier industries and adding Total Value Added, which includes employee compensation, indirect business tax and non-tax liability, and other value-added items. $IndustryPercentageSold_{sr}$ refers to the percentage of the rth industry's output that is sold to the sth customer industry. The rth industry's output is computed by adding the output sold across all customer industries, excluding industry r itself, and including personal consumption expenditures, gross private fixed investments, government consumption expenditures, and gross investment.

3.2. Measure of corporate social responsibility

Following Deng et al. (2013), we estimate a firms' annual CSR performance based on the data from the KLD Research & Analytics (KLD) Database. This database covers the strengths and weaknesses of CSR at the firm level in terms of seven dimensions: corporate governance, community, diversity, employee relations, environment, human rights, and product. A firm's total CSR strength score in the year is the sum of the firm's CSR strength scores deflated by the total number of strength items within the same dimension-year. A firm's total CSR weakness score in the year is the sum of the firm's CSR weakness scores deflated by the total number of total items within the same dimension-year. The firm's total CSR score (*CSR*) for the year is the difference between the total CSR strength score and the total CSR weakness score of the year, adjusted by subtracting the industry median value of *CSR* in the year based on the two-digit SIC code. This adjustment prevents the social performance measure from leaning toward any specific CSR dimension.

3.3. Model specifications

We test the hypothesis according to Eqs. (3) and (4). For robustness, we employ two alternative measures of income smoothing, following Lang et al. (2012). The first measure, *SMTH_RATIO*, represents earnings volatility relative to the volatility of cash flows, multiplied by negative one. A higher *SMTH_RATIO* results in smoother net income relative to cash flows. The second measure, *SMTH_CORR*, is the correlation between accruals and operating cash flow, multiplied by negative one. A higher *SMTH_CORR* represents a higher level of income smoothness. In Eqs. (3) and (4), the income-smoothing measure is regressed on the total CSR score, the measure of the supplier-buyer relationship, and a

[6] We appreciate Dr. Rauch for his kindness. The website is listed as follows: http://econweb.ucsd.edu/~jrauch/rauch_classification.html

[7] Nunn (2007) constructed a concordance using the 4-digit SITC to the 10-digit Harmonized System (HS10) concordance from Feenstra (1996) and the HS10 to I–O classification concordance from the BEA.

[8] A more detailed procedure is specified in the appendix of Raman and Shahrur (2008).

[9] See https://www.careerinfonet.org/industry/Ind_Sic.aspx?id=8&nodeid=10

set of control variables. We expect the coefficient on *CSR* to be significantly negative in Eqs. (3) and (4) if a firm making more effort to engage in CSR activities is associated with a lower level of income smoothness. We expect a negative coefficient on the interaction term *CSR* × *RS_INPUT* in Eq. (3) and negative coefficients on the interaction terms *CSR* × *RS_SUPPLIER* and *RS_CUSTOMER* in Eq. (4) if a stronger supply chain relationship motivates a socially responsible firm to reduce income smoothing. Following the literature (Lang et al., 2012), we also include a set of variables to control for firm size (*LNASSETS*), leverage (*LEV*), growth opportunity (*BM*), sales volatility (*STD_SALES*), net loss, (*LOSS*), the length of the operating cycle (*OPCYCLE*), sales growth (*SG*), the percentage of fixed assets (*OPLEV*), and the level of operating cash flow (*CFO*). To mitigate concerns over time-series correlations among residuals, the standard errors are clustered on firms and years for all tested models.

$$\begin{aligned} SMOOTH_{it} = {} & \alpha_0 + \alpha_1 CSR_{it} + \alpha_2 RS\_INPUT_{it} \\ & + \alpha_3 CSR_{it} \times RS\_INPUT_{it} + \alpha_4 LNASSETS_{it} \\ & + \alpha_5 LEV_{it} + \alpha_6 BM_{it} + \alpha_7 STD\_SALES_{it} + \alpha_8 LOSS_{it} + \alpha_9 OPCYCLE_{it} \\ & + \alpha_{10} SG_{it} + \alpha_{11} OPLEV_{it} + \alpha_{12} CFO_{it} + \varepsilon_{i,t} \end{aligned} \tag{3}$$

$$\begin{aligned} SMOOTH_{it} = {} & \beta_0 + \beta_1 CSR_{it} + \beta_2 RS\_SUPPLIER_{it} \\ & + \beta_3 CSR_{it} \times RS\_SUPPLIER_{it} \\ & + \beta_4 RS\_CUSTOMER_{it} + \beta_5 CSR_{it} \times RS\_CUSTOMER_{it} \\ & + \beta_6 LNASSETS_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \beta_9 STD\_SALES_{it} \\ & + \beta_{10} LOSS_{it} + \beta_{11} OPCYCLE_{it} + \beta_{12} SG_{it} + \beta_{13} OPLEV_{it} \\ & + \beta_{14} CFO_{it} + \varepsilon_{i,t} \end{aligned} \tag{4}$$

where $SMOOTH_{it}$ refers to either *SMTH_RATIO* or *SMTH_CORR* for firm *i* in year *t*. *SMTH_RATIO* is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). *SMTH_RATIO* is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). *SMTH_CORR* is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm *i* in year *t*, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the *CSR* for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm *i* in year *t*, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on the R&D of supplier and customer industries for firm *i* in year *t*, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm *i* in year *t*. LEV_{it} refers to total liabilities divided by total assets for firm *i* in year *t*. BM_{it} refers to the book value of equity divided by the market value for firm *i* in year *t*. STD_SALES_{it} refers to the standard deviation of sales for firm *i* in year *t*, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm *i* in year *t*, where operating cycle = $360\ days \times \frac{Average\ Accounts\ Receivable}{Total\ Revenue} + 360\ days \times \frac{Average\ Inventories}{Cost\ of\ Goods\ Sold}$. SG_{it} refers to the average sales growth over the past three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm *i* in year *t*. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

3.4. Data and sample selection

We examine a sample of U.S. publicly held companies from 1991 to 2013. The sample period begins in 1991 because it is the earliest year that the KLD data is available. The CSR data comes from the KLD Database. The financial data comes from the Compustat database. The data for stock returns comes from the CRSP database. We exclude financial and insurance industries (two-digit SIC code = 60–69) due to the substantial differences in their financial reporting practices. We trim the top and bottom one percentiles of all continuous variables to reduce the impact of outliers. The final sample contains 26,798 firm-years.

Table 1 reports the sample distributions by year and industry. Panel A reports the sample distribution by year. The number of CSR firms increases significantly after 2003 because the KLD reported only S&P 500 firms from 1991 to 2002 and began to include Russell 3000 firms in 2003. In Column (4) of Panel A, the ratio of the final CSR sample to non-financial CSR firms appears to be stable, with the lowest ratio being 77% and the highest being 87%. Panel B reports the final sample distribution by industry. In Panel B, the manufacturers of durable goods comprise the largest portion of the final sample (23.8%), followed by those in the computer industry (16.0%) and the retailing industry (12.5%). Overall, Table 1 shows that the final sample covers a variety of industries and does not cluster in specific years.

4. Empirical results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics. As stated in the previous sections, $SMTH\_RATIO_{it}$ and $SMTH\_CORR_{it}$ are multiplied by negative one in the estimation procedure for ease of exposition. Therefore, a high value for these two variables represents a high level of income smoothness. The mean value of $SMTH\_RATIO_{it}$ is −0.831, which suggests that one dollar of cash flow volatility is associated with $0.831 of earnings volatility. The mean value of $SMTH\_CORR_{it}$ is 0.550, which suggests that operating cash flow is positively correlated to accruals. The mean and median values of CSR_{it} are 0.046 and 0.000, respectively, indicating that CSR_{it} is slightly right-skewed. On average, the inputs that are not sold on exchange and do not have reference prices (RS_INPUT_{it}) account for 56.6% of the total inputs in an industry. In addition, the 25th percentile and the 75th percentile of RS_INPUT_{it} are 0.363 and 0.765, respectively. Coupled with the median value of 0.581, the descriptive statistics indicate that RS_INPUT_{it} is close to a normal distribution. The mean value of $RS\_CUSTOMER_{it}$ (0.009) is slightly higher than that of $RS\_SUPPLIER_{it}$ (0.007). In addition, the $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ values in the 90th percentile are 0.014, and 0.023, respectively. This suggests that firms in customer industries have higher R&D dependence on their supply chain partners than those in supplier industries. However, $RS\_CUSTOMER_{it}$ is almost twice the standard deviation of $RS\_SUPPLIER_{it}$, which indicates that firms in customer industries exhibit volatile R&D dependence on their supply chain partners.

The descriptive statistics for other control variables show that total assets $LNASSETS_{it}$ are slightly right-skewed, as evidenced by the mean value of 7.223 and the median value of 7.124. On average, 20.5% of the CSR firms' total assets are borrowed from their creditors. The book-to-market ratio (*BM*) is widely distributed, as evidenced by the mean value of 0.517 and the standard deviation of 0.977. On average, CSR firms experienced net losses of over 20% in the previous three to five years ($LOSS_{it}$). Overall, Table 2 provides little evidence that our sample could be driven by firm characteristics.

Table 3 reports the Pearson correlations among the regression variables. Because most of the variables are continuous variables, we do not tabulate the Spearman correlations. The two alternative income-smoothing measures, $SMTH\_RATIO_{it}$ and $SMTH\_CORR_{it}$, are positively

Tables 1
Sample distribution.

Panel A. Sample distribution by year

Year	(1) All CSR firms	(2) Non-financial CSR firms	(3) Final sample	(4) = (3)/(2)
1991	647	579	448	77%
1992	652	587	452	77%
1993	651	586	451	77%
1994	643	575	449	78%
1995	648	575	442	77%
1996	652	578	456	79%
1997	653	578	453	78%
1998	658	578	458	79%
1999	662	584	474	81%
2000	660	579	473	82%
2001	1107	927	723	78%
2002	1108	888	720	81%
2003	2963	2283	1913	84%
2004	3034	2388	1929	81%
2005	3015	2339	1888	81%
2006	2962	2322	1881	81%
2007	2937	2306	1850	80%
2008	2923	2299	1892	82%
2009	2912	2328	1991	86%
2010	2965	2343	1995	85%
2011	2848	2240	1934	86%
2012	2798	2173	1881	87%
2013	2420	1897	1645	87%
Total	40,518	32,532	26,798	82%

Panel B. Sample distribution by industry

Industry	Four-Digit SIC code	Final sample	Percentage
Mining and construction	1000–1199, 1400–1499	204	0.8%
Food	2000–2111	866	3.2%
Textiles, printing, and publishing	2200–2780	1615	6.0%
Chemicals	2800–2824, 2840–2899	1029	3.8%
Pharmaceuticals	2830–2836	1612	6.0%
Extractive industries	2900–2999, 1300–1399	1441	5.4%
Durable manufacturers	3000–3569, 3580–3669, 3680–3999	6383	23.8%
Computers	7370–7379, 3570–3579, 3670–3679	4295	16.0%
Transportation	4000–4899	1674	6.2%
Utilities	4900–4999	1593	5.9%
Retail	5000–5999	3346	12.5%
Service	7000–7369, 7380–8999	2299	8.6%
Others		441	1.6%
Total		26,798	

Panels A and B present the number of observations by year and industry, respectively. The difference in sample size between Columns (2) and (3) of Panel A is solely due to missing values for the variables used in the regression analyses.

correlated to each other (0.66). The measures of supplier-customer relationship are negatively correlated with the two alternative income-smoothing measures. $SMTH\_RATIO_{it}$ is negatively correlated with RS_INPUT_{it} (−0.13), $RS\_SUPPLIER_{it}$ (−0.10), and $RE\_CUSTOMER_{it}$ (−0.07). Likewise, $SMTH\_CORR_{it}$ is negatively correlated with RS_INPUT_{it} (−0.13), $RS\_SUPPLIER_{it}$ (−0.11), and $RE\_CUSTOMER_{it}$ (−0.09). These results imply that managers of firms place more weight on the supply chain relationship than on CSR activities in regard to their income-smoothing decisions.

The results for the other variables indicate that income smoothing increases with size ($LNASSETS_{it}$), leverage (LEV_{it}), sales volatility (STD_SALES_{it}), the intensity of fixed assets ($OPLEV_{it}$), and operating cash flows (CFO_{it}). In contrast, income smoothing decreases with frequency of loss ($LOSS_{it}$) and sales growth (SG_{it}).

4.2. Regression analyses

Table 4 reports the regression results. Panel A reports the regression results when $SMTH\_RATIO_{it}$ is used as the dependent variable. In Column (1) of Panel A, the coefficient on CSR_{it} is significantly negative (−0.017; t-value = −2.63), which suggests that firms with better CSR performance are associated with a lower levels of income smoothness. The coefficient on LEV_{it} is significantly positive (0.240; t-value = 10.62), suggesting that firms tend to smooth earnings in order to acquire favorable contract terms with creditors, consistent with Trueman and Titman (1988). The coefficient on $OPLEV_{it}$ is significantly positive (0.098; t-value = 6.26), suggesting that firms having more fixed assets exhibit higher levels of income smoothing. The negative coefficients on $LOSS_{it}$ (−0.575; t-value = −36.30) and CFO_{it} (−0.378; t-value = −11.28) indicate that firms experiencing loss and those not having sufficient operating cash flow are associated with lower levels of income smoothing. In Column (2) of Panel A, we further consider the supply chain relationship (RS_INPUT_{it}) and its interaction with CSR_{it}. The coefficient on CSR_{it} becomes statistically insignificant once RS_INPUT_{it} has been included. The coefficient on RS_INPUT_{it} is significantly negative (−0.117; t-value = −5.29), indicating that firms intensively using inputs for relationship-specific investments are associated with lower levels of income smoothing. The coefficient on $CSR_{it} \times RS\_INPUT_{it}$ is significantly negative (−0.065; t-value = −2.35), indicating that firms with better CSR performance that are paying more attention to the supply chain relationship exhibit have fewer incentives to smooth earnings as compared to other firms. If firms acquire a lot of specialized inputs, they tend to produce more specialized outputs that are demanded only by a specific group of customers. Thus, the negative coefficient on $CSR_{it} \times RS\_INPUT_{it}$ also implies that socially responsible firms providing products that are more specialized are associated with lower levels of income smoothing. In Column (3) of Panel A, we consider $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$, and their interaction with CSR_{it}. The coefficient on $CSR_{it} \times RS\_SUPPLIER_{it}$ is negative but statistically insignificant. The coefficient on $CSR_{it} \times RS\_CUSTOMER_{it}$ is significantly negative (−1.499; t-value = −2.58), which indicates that downstream firms with better CSR performance and higher dependence on the R&D projects of downstream supply chain partners have lower levels of income smoothing.

Panel B of Table 4 reports the regression results when the alternative income-smoothing measure, $SMTH\_CORR_{it}$, is used as the dependent variable. The results in Columns (2) and (3) of Panel B are similar to those in Panel A. In Column (2), the coefficient on $CSR_{it} \times RS\_INPUT_{it}$ is significantly negative (−0075; t-value = −3.13). In Column (3), both of the coefficients on $CSR_{it} \times RS\_SUPPLIER_{it}$ and $CSR_{it} \times RS\_CUSTOMER_{it}$ are significantly negative, suggesting that highly R&D-dependent firms having better CSR performance in upstream and downstream industries exhibit low levels of income smoothing. Overall, Table 4 provides empirical supports for the hypothesis, which posits that greater supply chain dependence motivates socially responsible firms to reduce income smoothing.

4.3. Additional analyses

4.3.1. Perform the analysis using the lag model

Expressed by Eqs. (5A) and (5B), we further perform the analysis using the lag model. We omit the interpretation of the variable definitions for parsimony.

$$SMOOTH_{it+1} = \alpha_0 + \alpha_1 CSR_{it} + \alpha_2 RS\_INPUT_{it} + \alpha_3 CSR_{it} \times RS\_INPUT_{it} + \alpha_4 LNASSETS_{it} + \alpha_5 LEV_{it} + \alpha_6 BM_{it} + \alpha_7 STD\_SALES_{it} + \alpha_8 LOSS_{it} + \alpha_9 OPCYCLE_{it} + \alpha_{10} SG_{it} + \alpha_{11} OPLEV_{it} + \alpha_{12} CFO_{it} + \varepsilon_{it} \quad (5A)$$

Table 2
Descriptive statistics.

Variable	Observation	Mean	Std.	Percentile				
				10th	25th	50th	75th	90th
$SMTH\_RATIO_{it}$	26,798	−0.831	0.575	−1.379	−1.057	−0.769	−0.466	−0.265
$SMTH\_CORR_{it}$	26,798	0.550	0.497	−0.260	0.313	0.755	0.932	0.982
CSR_{it}	26,798	0.046	0.535	−0.476	−0.220	0.000	0.250	0.573
RS_INPUT_{it}	17,019	0.566	0.254	0.184	0.363	0.581	0.765	0.891
$RS\_SUPPLIER_{it}$	25,869	0.007	0.007	0.001	0.002	0.005	0.008	0.014
$RS\_CUSTOMER_{it}$	25,850	0.009	0.013	0.000	0.001	0.004	0.010	0.023
$LNASSETS_{it}$	26,798	7.223	1.633	5.194	6.011	7.124	8.320	9.467
LEV_{it}	26,798	0.205	0.174	0.000	0.033	0.192	0.322	0.436
BM_{it}	26,798	0.517	0.977	0.155	0.266	0.429	0.645	0.915
STD_SALES_{it}	26,798	758	2713	24	58	167	522	1496
$LOSS_{it}$	26,798	0.20	0.29	0	0	0	0.40	0.60
$OPCYCLE_{it}$	26,798	0.103	0.776	0.016	0.024	0.036	0.068	0.184
SG_{it}	26,798	0.461	11.159	−0.011	0.038	0.099	0.205	0.393
$OPLEV_{it}$	26,798	0.293	0.237	0.046	0.101	0.219	0.435	0.679
CFO_{it}	26,798	0.027	0.135	−0.063	0.008	0.043	0.082	0.125

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm i in year t, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm i in year t, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm i in year t, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm i in year t. LEV_{it} refers to total liabilities divided by total assets for firm i in year t. BM_{it} refers to book value of equity divided by market value for firm i in year t. STD_SALES_{it} refers to the standard deviation of sales for firm i in year t, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm i in year t. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm i in year t. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

$$\begin{aligned} SMOOTH_{it+1} = {} & \beta_0 + \beta_1 CSR_{it} + \beta_2 RS\_SUPPLIER_{it} \\ & + \beta_3 CSR_{it} \times RS\_SUPPLIER_{it} \\ & + \beta_4 RS\_CUSTOMER_{it} + \beta_5 CSR_{it} \times RS\_CUSTOMER_{it} \\ & + \beta_6 LNASSETS_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \beta_9 STD\_SALES_{it} \\ & + \beta_{10} LOSS_{it} + \beta_{11} OPCYCLE_{it} + \beta_{12} SG_{it} + \beta_{13} OPLEV_{it} \\ & + \beta_{14} CFO_{it} + \varepsilon_{it} \end{aligned} \quad (5B)$$

Table 5 reports the results of the relation between income smoothness and the lagged determinants. The coefficient on CSR_{it} in Column (1) of Panel A is significantly negative (−0.024; t-value = −3.46), suggesting that managers' previous commitments to CSR signal their determination to reduce opportunistic behavior. The coefficients on $CSR_{it} \times RS\_INPUT_{it}$, $CSR_{it} \times RS\_SUPPLIER_{it}$, and $CSR_{it} \times RS\_CUSTOMER_{it}$ in Panel A are all significantly negative. This suggests that firms with better CSR performance and greater supply chain dependence exhibit lower levels of future income smoothing. In Panel B, the results are consistent when we use $SMTH\_CORR_{it}$ as the dependent variable. The coefficients on $CSR_{it} \times RS\_INPUT_{it}$, $CSR_{it} \times RS\_SUPPLIER_{it}$, and $CSR_{it} \times RS\_CUSTOMER_{it}$ in Panel B are all significantly negative. Overall, Table 5 further lends supports to the hypothesis.

4.3.2. Analysis of spurious correlations

The relation between the degree of income smoothing and CSR could be spurious if it is simultaneously affected by unobservable factors. For instance, ongoing implicit claims between a firm and its stakeholders create incentives for managers to choose long-run, income-increasing accounting methods (Bowen et al., 1995; Raman & Shahrur, 2008). Taking R&D as an example, managers of R&D-intensive firms may perceive more implicit claims from stakeholders than those of other firms. On the one hand, R&D is beneficial to CSR performance because stakeholders view innovation as an advantageous CSR commitment. On the other hand, intensive R&D may lead to volatile earnings because most R&D expenditures are recognized as R&D expenses when they are incurred instead of being amortized during the economic life. Hence, the findings that socially responsible firms with higher dependence on supply chain partners' R&D projects exhibit lower levels of income smoothing could be solely due to stakeholders' implicit claims.

To consider potential spurious correlations, we perform two-stage least square regression analyses. In the first stage, we regress a firm's total CSR score on a set of control variables used in Eqs. (3) and (4) and a set of variables that are related to stakeholders' implicit claims. Following Bowen et al. (1995), we include the following implicit-claim-related variables: (1) an indicator variable that represents the durable goods industry, (2) the average R&D intensity over the previous three years, (3) the ratio of cost of goods sold to total assets, (4) an indicator variable that represents the manufacturing industry, (5) the ratio of fixed assets to total assets, (6) an indicator variable that represents a firm with a defined benefit pension plan, (7) the ratio of short-term liabilities to total assets, and (8) the average advertising intensity over the previous three years. In addition to the eight implicit-claim-related variables, we include the ratio of long-term debt to total assets, which represents the implicit claims of long-term creditors. In the second stage, we then regress the income smoothing measure on the residual term estimated from the first-staged regression model, the variables of interest, and a set of control variables used in Eqs. (3) and (4).

Eq. (6) shows the first-stage regression, while Eqs. (7A) and (7B) represent the second-stage regression, respectively. Expressed by Eqs. (7A) and (7B), the income smoothing measure is regressed on the residual term (CSR_{it}^{res}) estimated from Eq. (6), the measures of supplier and customer relationship, and a set of control variables used in Eqs. (3) and (4). Because the definitions of the variables in Eqs. (7A) and (7B) are the same as those in Eqs. (3) and (4), we omit the interpretation of the variable definitions for parsimony. Similarly, we expect negative

Table 3
Pearson correlations.

Variable	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)		(11)		(12)		(13)		(14)		(15)
(1) $SMTH\_RATIO_{it}$	1																												
(2) $SMTH\_CORR_{it}$	0.66	***	1																										
(3) CSR_{it}	−0.09	*	−0.08	*	1																								
(4) RS_INPUT_{it}	−0.13	***	−0.13	***	0.05	***	1																						
(5) $RS\_SUPPLIER_{it}$	−0.10	***	−0.11	***	0.02	***	0.41	***	1																				
(6) $RS\_CUSTOMER_{it}$	−0.07	***	−0.09	***	0.01		0.20	***	0.45	***	1																		
(7) $LNASSETS_{it}$	0.12	***	0.14	***	0.08	***	−0.28	***	−0.08	***	−0.06	***	1																
(8) LEV_{it}	0.09	***	0.08	***	−0.03	***	−0.36	***	−0.16	***	−0.13	***	0.38	***	1														
(9) BM_{it}	0.01		0.01		−0.03	***	−0.08	***	−0.05	***	0.00		0.00		0.03	***	1												
(10) STD_SALES_{it}	0.03	***	0.04	***	−0.01		−0.13	***	0.00		−0.03	***	0.43	***	0.03	***	−0.01		1										
(11) $LOSS_{it}$	−0.24	***	−0.35	***	−0.07	***	0.15	***	0.14	***	0.09	***	−0.34	***	0.01		0.04	***	−0.10	***	1								
(12) $OPCYCLE_{it}$	0.00		0.00		0.00		−0.04	***	−0.04	***	−0.02	***	−0.04	***	−0.01		0.00		0.00		0.02	***	1						
(13) SG_{it}	−0.01	**	−0.02	***	0.01		0.00		−0.01		−0.01	*	0.00		0.03	***	−0.01		0.00		0.05	***	0.00		1				
(14) $OPLEV_{it}$	0.10	***	0.11	***	−0.03	***	−0.65	***	−0.30	***	−0.19	***	0.29	***	0.36	***	0.07	***	0.07	***	−0.16	***	0.04	***	0.02	***	1		
(15) CFO_{it}	0.11	***	0.20	***	0.06	***	−0.04	***	−0.10	***	−0.07	***	0.27	***	−0.04	***	−0.02	***	0.08	***	−0.66	***	−0.02	**	−0.04	***	0.14	***	1

This table presents Pearson correlations for dyads of each two variables. ***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively.
$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm i in year t, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm i in year t, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm i in year t, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm i in year t. LEV_{it} refers to total liabilities divided by total assets for firm i in year t. BM_{it} refers to book value of equity divided by market value for firm i in year t. STD_SALES_{it} refers to the standard deviation of sales for firm i in year t, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm i in year t. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm i in year t. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

Table 4
CSR, income smoothing, and supplier-buyer relationships.

	(1)			(2)			(3)		
Variable	Coefficient	t-Value		Coefficient	t-Value		Coefficient	t-Value	
Panel A. Dependent variable: $SMTH\_RATIO_{it}$									
Intercept	−0.790	−41.48	***	−0.695	−23.41	***	−0.757	−38.11	***
CSR_{it}	−0.017	−2.63	***	0.021	1.28		0.005	0.56	
RS_INPUT_{it}				−0.117	−5.29	***			
$CSR_{it} \times RS\_INPUT_{it}$				−0.065	−2.35	**			
$RS\_SUPPLIER_{it}$							−3.531	−6.08	***
$RS\_CUSTOMER_{it}$							−0.617	−2.13	**
$CSR_{it} \times RS\_SUPPLIER_{it}$							−1.260	−1.23	
$CSR_{it} \times RS\_CUSTOMER_{it}$							−1.499	−2.58	***
$LNASSETS_{it}$	0.001	0.30		−0.007	−2.17	**	0.002	0.66	
LEV_{it}	0.240	10.62	***	0.280	9.41	***	0.224	9.62	***
BM_{it}	0.005	1.49		0.027	2.82	***	0.005	1.33	
STD_SALES_{it}	0.000	0.69		0.000	−1.59		0.000	0.62	
$LOSS_{it}$	−0.575	−36.30	***	−0.570	−28.88	***	−0.567	−34.71	***
$OPCYCLE_{it}$	0.006	1.28		0.004	0.20		0.004	0.94	
SG_{it}	0.000	−1.18		−0.005	−2.70	***	0.000	−1.24	
$OPLEV_{it}$	0.098	6.26	***	0.033	1.37		0.066	3.98	***
CFO_{it}	−0.378	−11.28	***	−0.416	−10.29	***	−0.390	−11.43	***
Observations	26,798			17,019			25,850		
F-value	209.26	***		118.76	***		149.35	***	
Adj. R^2	0.07			0.08			0.07		
Panel B. Dependent variable: $SMTH\_CORR_{it}$									
Intercept	0.627	39.31	***	0.699	26.99	***	0.658	40.02	***
CSR_{it}	−0.019	−3.54	***	0.020	1.35		0.007	0.87	
RS_INPUT_{it}				−0.078	−4.03	***			
$CSR \times RS\_INPUT_{it}$				−0.075	−3.13	***			
$RS\_SUPPLIER_{it}$							−2.351	−4.89	***
$RS\_CUSTOMER_{it}$							−1.157	−4.82	***
$CSR_{it} \times RS\_SUPPLIER_{it}$							−1.818	−2.14	**
$CSR_{it} \times RS\_CUSTOMER_{it}$							−1.545	−3.21	***
$LNASSETS_{it}$	−0.002	−0.74		−0.008	−2.88	***	−0.001	−0.32	
LEV_{it}	0.204	10.77	***	0.265	10.21	***	0.189	9.78	***
BM_{it}	0.009	2.98	***	0.032	3.78	***	0.008	2.79	***
STD_SALES_{it}	0.000	0.18		0.000	−1.77	*	0.000	0.01	
$LOSS_{it}$	−0.628	−47.44	***	−0.679	−39.41	***	−0.622	−45.96	***
$OPCYCLE_{it}$	0.007	1.94	*	−0.031	−1.84	*	0.006	1.54	
SG_{it}	0.000	−1.14		0.000	−0.11		0.000	−1.23	
$OPLEV_{it}$	0.071	5.37	***	0.018	0.86		0.043	3.12	***
CFO_{it}	−0.143	−5.11	***	−0.206	−5.83	***	−0.166	−5.87	***
Observations	26,798			17,019			25,850		
F-value	400.05	***		228.95	***		284.75	***	
Adj. R^2	0.13			0.14			0.13		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively. The standard deviations of the regression results are adjusted by clustering on firms and years.

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm i in year t, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm i in year t, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm i in year t, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm i in year t. LEV_{it} refers to total liabilities divided by total assets for firm i in year t. BM_{it} refers to book value of equity divided by market value for firm i in year t. STD_SALES_{it} refers to the standard deviation of sales for firm i in year t, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm i in year t. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm i in year t. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

signs on the coefficients of CSR_{it}^{res}, $CSR_{it}^{res} \times RS\_INPUT_{it}$, $CSR_{it}^{res} \times RS\_SUPPLIER_{it}$, and $CSR_{it}^{res} \times RS\_CUSTOMER_{it}$.

$$CSR_{it} = \gamma_0 + \sum Implicit\_Claims_{it} + \sum Control\ Variables_{it} + \varepsilon_{it} \quad (6)$$

$$SMOOTH_{it} = \alpha_0 + \alpha_1 CSR_{it}^{res} + \alpha_2 RS\_INPUT_{it} + \alpha_3 CSR_{it}^{res} \times RS\_INPUT_{it} + \sum Control\ Variables_{it} + \varepsilon_{it} \quad (7A)$$

$$SMOOTH_{it} = \beta_0 + \beta_1 CSR_{it}^{res} + \beta_2 RS\_SUPPLIER_{it} + \beta_3 CSR_{it}^{res} \times RS\_SUPPLIER_{it} + \beta_4 RS\_CUSTOMER_{it} + \beta_5 CSR_{it}^{res} \times RS\_CUSTOMER_{it} + \sum Control\ Variables_{it} + \varepsilon_{it} \quad (7B)$$

Table 6 reports the second-stage regression results. The coefficient on CSR_{it}^{res} in Column (1) of Panel A is negative but statistically insignificant, while the coefficient on CSR_{it}^{res} in Column (1) of Panel B is

Table 5
The relation between income smoothness and lagged determinants.

	(1)			(2)			(3)		
Variable	Coefficient	t-Value		Coefficient	t-Value		Coefficient	t-Value	
Panel A. Dependent variable: $SMTH\_RATIO_{i,t+1}$									
Intercept	−0.794	−40.20	***	−0.707	−22.81	***	−0.756	−36.70	***
CSR_{it}	−0.024	−3.46	***	0.048	2.52	**	0.002	0.24	
RS_INPUT_{it}				−0.127	−5.45	***			
$CSR \times RS\_INPUT_{it}$				−0.126	−4.08	***			
$RS\_SUPPLIER_{it}$							−4.095	−6.91	***
$RS\_CUSTOMER_{it}$							−0.929	−3.13	***
$CSR_{it} \times RS\_SUPPLIER_{it}$							−2.198	−2.05	**
$CSR_{it} \times RS\_CUSTOMER_{it}$							−1.178	−1.93	*
$LNASSETS_{it}$	0.001	0.20		−0.004	−1.21		0.002	0.78	
LEV_{it}	0.218	9.27	***	0.244	7.80	***	0.195	8.07	***
BM_{it}	0.006	0.80		0.013	1.27		0.004	0.52	
STD_SALES_{it}	0.000	0.16		0.000	−2.11	**	0.000	0.15	
$LOSS_{it}$	−0.521	−31.63	***	−0.518	−24.86	***	−0.512	−30.08	***
$OPCYCLE_{it}$	0.007	1.69	*	0.020	1.01		0.006	1.33	
SG_{it}	0.000	−0.71		−0.008	−3.69	***	0.000	−0.81	
$OPLEV_{it}$	0.096	5.89	***	0.027	1.04		0.059	3.42	***
CFO_{it}	−0.333	−9.62	***	−0.369	−8.67	***	−0.340	−9.66	***
Observations	24,170			15,444			23,333		
F-value	162.79	***		95.63	***		121.51	***	
Adj. R^2	0.06			0.07			0.07		
Panel B. Dependent variable: $SMTH\_CORR_{i,t+1}$									
Intercept	0.632	37.73	***	0.714	26.45	***	0.665	38.36	***
CSR_{it}	−0.021	−3.70	***	0.037	2.24	**	0.007	0.83	
RS_INPUT_{it}				−0.103	−5.07	***			
$CSR_{it} \times RS\_INPUT_{it}$				−0.118	−4.39	***			
$RS\_SUPPLIER_{it}$							−2.565	−5.15	***
$RS\_CUSTOMER_{it}$							−1.306	−5.22	***
$CSR_{it} \times RS\_SUPPLIER_{it}$							−2.112	−2.34	**
$CSR_{it} \times RS\_CUSTOMER_{it}$							−1.587	−3.10	***
$LNASSETS_{it}$	−0.002	−1.05		−0.007	−2.25	**	−0.001	−0.45	
LEV_{it}	0.164	8.24	***	0.213	7.80	***	0.142	7.01	***
BM_{it}	0.008	1.27		0.012	1.32		0.008	1.16	
STD_SALES_{it}	0.000	0.09		0.000	−2.11	**	0.000	0.02	
$LOSS_{it}$	−0.605	−43.28	***	−0.652	−35.93	***	−0.602	−42.02	***
$OPCYCLE_{it}$	0.008	2.14	**	0.001	0.04		0.007	1.79	*
SG_{it}	0.000	0.17		−0.001	−0.67		0.000	0.08	
$OPLEV_{it}$	0.081	5.83	***	0.014	0.64		0.052	3.61	***
CFO_{it}	−0.157	−5.36	***	−0.202	−5.44	***	−0.178	−6.01	***
Observations	24,170			15,444			23,333		
F-value	327.07	***		194.16	***		239.03	***	
Adj. R^2	0.12			0.13			0.13		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively. The standard deviations of the regression results are adjusted by clustering on firms and years.

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm *i* in year *t*, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm *i* in year *t*, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm *i* in year *t*, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm *i* in year *t*. LEV_{it} refers to total liabilities divided by total assets for firm *i* in year *t*. BM_{it} refers to book value of equity divided by market value for firm *i* in year *t*. STD_SALES_{it} refers to the standard deviation of sales for firm *i* in year *t*, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm *i* in year *t*. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm *i* in year *t*. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

significantly negative at a 10% significance level (−0.009; t-value = −1.65). These results provide some partial evidence suggesting that firms with better CSR performance engage in lower levels of income smoothing. The coefficients on $CSR_{it}^{res} \times RS\_INPUT_{it}$ are significantly negative in both Panels A and B. The coefficient on $CSR_{it}^{res} \times RS\_SUPPLIER_{it}$ in Panel A is negative but statistically insignificant, while the coefficient on $CSR_{it}^{res} \times RS\_SUPPLIER_{it}$ in Panel B is significantly negative. The coefficients on $CSR_{it}^{res} \times RS\_CUSTOMER_{it}$ are significantly negative in both Panels A and B. Overall, Table 6 qualitatively supports the hypothesis.

4.3.3. Two-stage least square regressions using instrumental variables

We further consider potential endogeneity between the degree of income smoothing and CSR by performing two-stage least square regressions using an instrumental variable approach. Rubin (2008) finds that U.S. firms with high CSR ratings tend to be located in Democratic states, or blue states. We create an indicator variable that equals one if a firm is located in the state dominated by the Democratic Party as our

Table 6
Analysis of spurious correlations: second-stage regression model.

	(1)			(2)			(3)		
Variable	Coefficient	t-Value		Coefficient	t-Value		Coefficient	t-Value	
Panel 6A. Dependent variable: $SMTH\_RATIO_{it}$									
Intercept	−0.788	−41.39	***	−0.691	−23.40	***	−0.752	−37.95	***
CSR_{it}^{res}	−0.008	−1.19		0.031	1.84	*	0.011	1.21	
RS_INPUT_{it}				−0.122	−5.51	***			
$CSR_{it}^{res} \times RS\_INPUT_{it}$				−0.075	−2.71	***			
$RS\_SUPPLIER_{it}$							−3.693	−6.37	***
$RS\_CUSTOMER_{it}$							−0.686	−2.38	**
$CSR_{it}^{res} \times RS\_SUPPLIER_{it}$							−1.528	−1.47	
$CSR_{it}^{res} \times RS\_CUSTOMER_{it}$							−1.113	−1.88	*
$LNASSETS_{it}$	0.000	0.05		−0.008	−2.31	**	0.001	0.39	
LEV_{it}	0.243	10.76	***	0.283	9.50	***	0.228	9.79	***
BM_{it}	0.005	1.54		0.027	2.87	***	0.005	1.35	
STD_SALES_{it}	0.000	0.84		0.000	−1.62		0.000	0.71	
$LOSS_{it}$	−0.574	−36.24	***	−0.568	−28.81	***	−0.567	−34.66	***
$OPCYCLE_{it}$	0.006	1.27		0.004	0.19		0.004	0.92	
SG_{it}	0.000	−1.21		−0.006	−2.72	***	0.000	−1.25	
$OPLEV_{it}$	0.100	6.35	***	0.034	1.40		0.067	4.02	***
CFO_{it}	−0.378	−11.30	***	−0.418	−10.32	***	−0.392	−11.49	***
Observations	26,798			17,019			25,850		
F-value	208.67	***		118.76	***		148.77	***	
Adj. R^2	0.07			0.08			0.07		
Panel 6B. Dependent variable: $SMTH\_CORR_{it}$									
Intercept	0.630	39.55	***	0.705	27.30	***	0.664	40.48	***
CSR_{it}^{res}	−0.009	−1.65	*	0.030	2.09	**	0.012	1.58	
RS_INPUT_{it}				−0.084	−4.33	***			
$CSR_{it}^{res} \times RS\_INPUT_{it}$				−0.084	−3.47	***			
$RS\_SUPPLIER_{it}$							−2.562	−5.34	***
$RS\_CUSTOMER_{it}$							−1.226	−5.14	***
$CSR_{it}^{res} \times RS\_SUPPLIER_{it}$							−2.090	−2.43	**
$CSR_{it}^{res} \times RS\_CUSTOMER_{it}$							−0.920	−1.88	*
$LNASSETS_{it}$	−0.002	−1.08		−0.009	−3.16	***	−0.002	−0.71	
LEV_{it}	0.207	10.96	***	0.270	10.37	***	0.193	10.01	***
BM_{it}	0.009	3.05	***	0.032	3.86	***	0.008	2.81	***
STD_SALES_{it}	0.000	0.37		0.000	−1.79	*	0.000	0.14	
$LOSS_{it}$	−0.627	−47.35	***	−0.677	−39.29	***	−0.621	−45.88	***
$OPCYCLE_{it}$	0.007	1.92	*	−0.032	−1.86	*	0.006	1.51	
SG_{it}	0.000	−1.18		0.000	−0.15		0.000	−1.25	
$OPLEV_{it}$	0.072	5.50	***	0.019	0.91		0.044	3.18	***
CFO_{it}	−0.144	−5.14	***	−0.208	−5.88	***	−0.168	−5.95	***
Observations	26,798			17,019			25,850		
F-value	398.92	***		228.63	***		283.33	***	
Adj. R^2	0.13			0.14			0.13		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively. The standard deviations of the regression results are adjusted by clustering on firms and years.

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm *i* in year *t*, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm *i* in year *t*, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm *i* in year *t*, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm *i* in year *t*. LEV_{it} refers to total liabilities divided by total assets for firm *i* in year *t*. BM_{it} refers to book value of equity divided by market value for firm *i* in year *t*. STD_SALES_{it} refers to the standard deviation of sales for firm *i* in year *t*, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm *i* in year *t*. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm *i* in year *t*. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

instrumental variable because it is correlated with CSR but not correlated with the error term in either Eqs. (3) or (4).

In the first stage, expressed by Eq. (8), we regress CSR_{it} on the instrumental variable ($BLUE_{it}$) and a set of control variables.

$$CSR_{it} = \gamma_0 + \gamma_1 BLUE_{it} + \sum Control\ Variables_{it} + \varepsilon_{it} \quad (8)$$

where $BLUE_{it}$ refers to the indicator variable that equals one if the *i*th firm's headquarters is located in a state where individual residences predominantly voted for the Democratic Party in both the previous and subsequent presidential election, and zero otherwise. For firm-years after 2012, $BLUE_{it}$ equals one if a firm's headquarters is located in a blue state for the presidential elections in both 2008 and 2012. Because all control variables are the same as those in Eqs. (3) and (4), we omit the

Table 7
Two-stage regression using instrumental variables.

	(1)			(2)			(3)		
Variable	Coefficient	t-Value		Coefficient	t-Value		Coefficient	t-Value	
Panel A. Dependent variable is $SMTH\_RATIO_{it}$									
Intercept	−0.797	−35.55	***	−0.677	−19.98	***	−0.753	−31.65	***
CSR^{fitted}	−0.059	−0.79		0.085	0.90		0.020	0.27	
RS_INPUT				−0.120	−5.37	***			
$CSR^{fitted} \times RS\_INPUT$				−0.034	−2.78	***			
$RS\_SUPPLIER$							−3.553	−6.11	***
$RS\_CUSTOMER$							−0.621	−2.14	**
$CSR^{fitted} \times RS\_SUPPLIER$							−0.965	−1.11	
$CSR^{fitted} \times RS\_CUSTOMER$							−1.430	−2.51	**
$LNASSETS$	0.003	0.62		−0.011	−2.07	**	0.001	0.24	
LEV	0.233	8.84	***	0.295	8.68	***	0.228	8.33	***
BM	0.005	1.32		0.031	2.91	***	0.005	1.35	
STD_SALES	0.000	0.27		0.000	−1.36		0.000	0.62	
$LOSS$	−0.578	−34.72	***	−0.564	−27.04	***	−0.566	−33.25	***
$OPCYCLE$	0.006	1.31		0.003	0.16		0.004	0.92	
SG	0.000	−1.09		−0.006	−2.74	***	0.000	−1.25	
$OPLEV$	0.094	5.46	***	0.044	1.66	*	0.068	3.75	***
CFO	−0.376	−11.18	***	−0.422	−10.31	***	−0.391	−11.42	***
Observations	26,798			17,019			25,850		
F-value	209.26	***		117.84	***		149.29	***	
Adj. R^2	0.07			0.08			0.07		
Panel B. Dependent variable is $SMTH\_CORR_{it}$									
Intercept	0.570	28.08	***	0.672	22.27	***	0.606	29.03	***
CSR_{it}^{fitted}	−0.381	−5.60	***	−0.172	−2.06	**	−0.302	−4.49	***
RS_INPUT_{it}				−0.077	−3.89	***			
$CSR_{it}^{fitted} \times RS\_INPUT_{it}$				−0.045	−4.14	***			
$RS\_SUPPLIER_{it}$							−2.244	−4.40	***
$RS\_CUSTOMER_{it}$							−1.158	−4.56	***
$CSR_{it}^{fitted} \times RS\_SUPPLIER_{it}$							−1.279	−1.67	*
$CSR_{it}^{fitted} \times RS\_CUSTOMER_{it}$							−1.493	−2.99	***
$LNASSETS_{it}$	0.013	3.54	***	−0.001	−0.12		0.012	3.23	***
LEV_{it}	0.139	5.84	***	0.236	7.81	***	0.132	5.50	***
BM_{it}	0.005	1.48		0.024	2.56	**	0.005	1.53	
STD_SALES_{it}	0.000	−2.76	***	0.000	−2.21	**	0.000	−2.56	**
$LOSS_{it}$	−0.653	−43.37	***	−0.692	−37.27	***	−0.642	−42.92	***
$OPCYCLE_{it}$	0.008	2.10	**	−0.030	−1.72	*	0.007	1.74	*
SG_{it}	0.000	−0.29		0.000	0.05		0.000	−0.51	
$OPLEV_{it}$	0.036	2.31	**	0.000	0.00		0.014	0.87	
CFO_{it}	−0.130	−4.26	***	−0.198	−5.43	***	−0.155	−5.16	***
Observations	26,798			17,019			25,850		
F-value	343.53	***		219.44	***		254.93	***	
Adj. R^2	0.11			0.13			0.12		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively. The standard deviations of the regression results are adjusted by clustering on firms and years.

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm i in year t, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT refers to the importance of relationship-specific investments across industries for firm i in year t, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm i in year t, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm i in year t. LEV_{it} refers to total liabilities divided by total assets for firm i in year t. BM_{it} refers to book value of equity divided by market value for firm i in year t. STD_SALES_{it} refers to the standard deviation of sales for firm i in year t, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm i in year t. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm i in year t. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

interpretation of the variable definitions for parsimony.

In the second stage, expressed by Eqs. (9A) and (9B), we then regress the income smoothing measure on the predicted value (CSR_{it}^{fitted}) estimated from Eq. (8), the measures of supplier and customer relationship, and a set of control variables used in Eqs. (3) and (4). We omit the interpretation of the variable definitions for parsimony. We expect negative signs on the coefficients of CSR_{it}^{fitted}, $CSR_{it}^{fitted} \times RS\_INPUT_{it}$, $CSR_{it}^{fitted} \times RS\_SUPPLIER_{it}$, and $CSR_{it}^{fitted} \times RS\_CUSTOMER_{it}$.

$$SMOOTH_{it} = \alpha_0 + \alpha_1 CSR_{it}^{fitted} + \alpha_2 RS\_INPUT_{it} + \alpha_3 CSR_{it}^{fitted} \times RS\_INPUT_{it} + \sum Control\ Variables_{it} + \varepsilon_{it} \quad (9A)$$

Table 8
Accounting informativeness of CSR firms' income smoothing behavior.

Income Smoothing =	$SMTH\_RATIO_{i,t}$			$SMTH\_CORR_{i,t}$		
Variable	Coefficient	t-Value		Coefficient	t-Value	
Intercept	0.157	11.52	***	0.138	12.26	***
X_{it-1}	−0.254	−6.46	***	0.090	4.09	***
X_{it}	0.331	5.98	***	−0.585	−36.32	***
$X_{[it+1,\ it+3]}$	0.108	2.92	***	0.138	16.49	***
$R_{[it+1,\ it+3]}$	−0.059	−6.84	***	−0.061	−9.28	***
$GOODCSR_{it}$	0.031	1.53		0.027	1.62	
$SMOOTH_{it}$	−0.002	−0.17		0.012	0.81	
$X_{it-1} \times SMOOTH_{t}$	−0.356	−10.36	***	−0.075	−1.82	
$X_{it} \times SMOOTH_{it}$	0.852	15.39	***	0.510	20.18	***
$X_{[it+1,\ it+3]} \times SMOOTH_{it}$	0.008	0.24		0.125	7.27	***
$R_{[it+1,\ it+3]} \times SMOOTH_{it}$	0.009	1.16		−0.006	−0.70	
$X_{it-1} \times GOODCSR_{it}$	−0.481	−5.48	***	−0.134	−3.16	***
$X_{it} \times GOODCSR_{it}$	−0.532	−6.99	***	0.093	3.58	***
$X_{[it+1,\ it+3]} \times GOODCSR_{it}$	−0.033	−0.56		0.160	6.83	***
$R_{[it+1,\ it+3]} \times GOODCSR_{it}$	−0.008	−0.57		−0.013	−1.17	
$GOODCSR_{it} \times SMOOTH_{it}$	0.033	1.63		−0.008	−0.36	
$X_{it-1} \times GOODCSR_{it} \times SMOOTH_{it}$	−0.288	−3.16	***	−0.114	−1.57	
$X_{it} \times GOODCSR_{it} \times SMOOTH_{it}$	−0.650	−9.43	***	−0.726	−18.35	***
$X_{[it+1,\ it+3]} \times GOODCSR_{it} \times SMOOTH_{it}$	−0.232	−4.26	***	−0.226	−5.96	***
$R_{[it+1,\ it+3]} \times GOODCSR_{it} \times SMOOTH_{it}$	−0.006	−0.42		0.019	1.22	
Observations	15,204			15,204		
F-value	132.19	***		148.42	***	
Adj. R^2	0.14			0.16		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively. The standard deviations of the regression results are adjusted by clustering on firms and years.
R_{it} refers to annual stock returns for firm *i* in year *t*. X_{it-1} refers to earnings per share for firm *i* in year *t-1*, scaled by the stock price per share at the beginning of year *t*. X_{it} refers to earnings per share for firm *i* in year *t*, scaled by the stock price per share at the beginning of year *t*. $X_{[it+1,\ it+3]}$ refers to the sum of earnings per share for Years $t+1$ through $t+3$, deflated by the stock price at the beginning of year *t*. $R_{[it+1,\ it+3]}$ refers to the annually compounded stock return of firm *i* for years $t+1$ through $t+3$. $SMOOTH_{it}$ refers to earnings smoothness for firm *i* in year *t*, which is either $SMTH\_RATIO_{it}$ or $SMTH\_CORR_{it}$. $GOODCSR_{it}$ is an indicator variable that equals one if the firm's CSR score is above the median value of its industry, and zero otherwise.

$$\begin{aligned} SMOOTH_{it} = {} & \beta_0 + \beta_1 CSR_{it}^{fitted} + \beta_2 RS\_SUPPLIER_{it} \\ & + \beta_3 CSR_{it}^{fitted} \times RS\_SUPPLIER_{it} \\ & + \beta_4 RS\_CUSTOMER_{it} + \beta_5 CSR_{it}^{fitted} \times RS\_CUSTOMER_{it} \\ & + \sum Control\ Variables_{it} + \varepsilon_{it} \end{aligned} \tag{9B}$$

Table 7 reports the second stage regression results using an instrumental variable approach. The coefficient on CSR_{it}^{fitted} in Column (1) of Panel A is negative but statistically insignificant, while the coefficient on CSR_{it}^{fitted} in Column (1) of Panel B is significantly negative (−0.381; t-value = −5.60). The coefficients on $CSR_{it}^{fitted} \times RS\_INPUT_{it}$ in panels A and B are −0.034 and − 0.045, respectively, and are both statistically significant. The coefficient on $CSR_{it}^{fitted} \times RS\_SUPPLIER_{it}$ in Panel A is negative but statistically insignificant, while the coefficient on $CSR_{it}^{fitted} \times RS\_SUPPLIER_{it}$ in Panel B is significantly negative. The coefficients on $CSR_{it}^{fitted} \times RS\_CUSTOMER_{it}$ are significantly negative in both panels A and B. Collectively, Table 7 shows that the main findings are less likely to be driven by potential endogeneity.

4.3.4. Accounting informativeness of CSR firms' income smoothing behavior

In this section, we examine how the market perceives socially responsible firms' efforts related to engaging in more CSR activities and reductions in income-smoothing behavior. Following Tucker and Zarowin (2006), we examine accounting informativeness by using the future earnings response coefficient (FERC) model. Expressed by Eq. (10), annual stock returns are regressed on past, current, and future earnings. The coefficients serve as market responses to earnings. In line with Tucker and Zarowin (2006), we expect a negative coefficient on past earnings (X_{it-1}), positive coefficients on current earnings (X_{it}), and future earnings ($X_{[it+1,\ it+3]}$), and a negative coefficient on future returns ($R_{[it+1,\ it+3]}$). We create an indicator variable, *GOODCSR*, which represents a firm with superior CSR performance in its industry. If income smoothing conveys information about future earnings, then we expect the coefficient on $X_{[it+1,\ it+3]} \times SMOOTH_{it}$ to be positive. If the garbling effect of income smoothing dominates, then future earnings will be less informative, and thus the coefficient is expected to be negative. If superior CSR performance conveys information about future earnings, we expect the coefficient on $X_{[it+1,\ it+3]} \times GOODCSR_{it}$ to be positive. We expect the coefficient on $X_{[it+1,\ it+3]} \times GOODCSR_{it} \times SMOOTH_{it}$ to be positive if the market perceives that the income smoothing of firms with superior CSR performance conveys more informative accounting information. Alternatively, we expect a negative sign on the coefficient of $X_{[it+1,\ it+3]} \times GOODCSR_{it} \times SMOOTH_{it}$ if the market perceives that firms with superior CSR performance and higher levels of income smoothing convey less informative accounting information on future earnings.

$$\begin{aligned} R_{it} = {} & \beta_0 + \beta_1 X_{it-1} + \beta_2 X_{it} + \beta_3 X_{[it+1,it+3]} + \beta_4 R_{[it+1,it+3]} + \beta_5 GOODCSR_{it} \\ & + \beta_6 SMOOTH_{it} \\ & + \beta_7 X_{it-1} \times SMOOTH_{it} + \beta_8 X_{it} \times SMOOTH_{it} + \beta_9 X_{[it+1,it+3]} \times SMOOTH_{it} \\ & + \beta_{10} R_{[it+1,it+3]} \times SMOOTH_{it} + \beta_{11} X_{it-1} \times GOODCSR_{it} \\ & + \beta_{12} X_{it} \times GOODCSR_{it} \\ & + \beta_{13} X_{[it+1,it+3]} \times GOODCSR_{it} + \beta_{14} GOODCSR_{it} \times SMOOTH_{it} \\ & + \beta_{15} X_{it-1} \times GOODCSR_{it} \times SMOOTH_{it} + \beta_{16} X_{it} \times GOODCSR_{it} \\ & \times SMOOTH_{it} \\ & + \beta_{17} X_{[it+1,it+3]} \times GOODCSR_{it} \times SMOOTH_{it} + \beta_{18} R_{[it+1,it+3]} \\ & \times GOODCSR_{it} \times SMOOTH_{it} + \varepsilon_{it} \end{aligned} \tag{10}$$

where R_{it} refers to annual stock returns for firm *i* in year *t*. X_{it-1} refers to earnings per share for firm *i* in year $t-1$, scaled by the stock price per share at the beginning of year *t*. X_{it} refers to earnings per share for firm *i* in year *t*, scaled by the stock price per share at the beginning of year *t*. $X_{[it+1,\ it+3]}$ refers to the sum of earnings per share for Years $t+1$

through $t + 3$, deflated by the stock price at the beginning of year t. $R_{[it+1,\ it+3]}$ refers to the annually compounded stock returns of firm i for years $t + 1$ through $t + 3$. $SMOOTH_{it}$ refers to earnings smoothness for firm i in year t, which is either $SMTH\_RATIO_{it}$ or $SMTH\_CORR_{it}$. $GOODCSR_{it}$ is an indicator variable that equals one if the firm's CSR score is above the median value of its industry, and zero otherwise.

Table 8 reports the regression results for Eq. (10). The coefficients on $X_{[it+1,\ it+3]} \times GOODCSR_{it} \times SMOOTH_{it}$ are significantly negative when either $SMTH\_RATIO_{it}$ or $SMTH\_CORR_{it}$ is used as the dependent variable. These findings suggest that the market perceives that firms with superior CSR performance and higher levels of income smoothing to convey less informative accounting information on future earnings than other firms. This is consistent with the view that reporting true but volatile earnings is better than reporting artificially smoothed earnings (Ball, 2006; Dichev & Tang, 2009).

4.4. Robustness checks

4.4.1. CSR strength and CSR weaknesses

Supply chain partners might consider a firm's CSR strengths and CSR concerns (weaknesses) differently. Thus, we calculate a firm's CSR strength score and CSR concern score as provided in the KLD database, respectively. Consistent with the calculation in the main analysis, a firm's total CSR strength score in the given year is the sum of the firm's CSR strength scores divided by the total number of strength items within the same dimension-year, then adjusted by subtracting the industry median value of CSR of the year based on the two-digit SIC code. Likewise, a firm's total CSR weakness score in the given year is the sum of the firm's CSR weakness scores divided by the total number of total items within the same dimension-year, then adjusted by subtracting the industry median value of CSR of the year based on the two-digit SIC code. We create a variable called *CSR_Strength*, which represents the CSR strength score. We create a variable named *CSR_Concern*, which represents the CSR weaknesses score. Panels A and B of Table 9 report the regression results when $SMTH\_RATIO_{i,t}$ and $SMTH\_CORR_{i,t}$ are the dependent variables, respectively. Panel A of Table 9 reports that the coefficient on $CSR\_Strength_{it} \times RS\_INPUT_{it}$ is −0.074 and is statistically significant at the 5% significance level, but the coefficient on $CSR\_Concern_{it} \times RS\_INPUT_{it}$ is statistically insignificant. These results indicate that supply chain partners pay a lot of attention to a firm's CSR strength as compared to its CSR weakness. The results in Column (3) of Panel A further indicate that the coefficient on $CSR\_Strength_{it} \times RS\_CUSTOMER_{it}$ is significantly negative, which suggests that firms with greater CSR strength and higher dependence on downstream supply chain partners' R&D projects exhibit lower levels of income smoothness. The results in Panel B remain similar to those in Panel A.

4.4.2. Firm-level supplier-customer relationship analysis

Following Dou et al. (2013), we also conduct a firm-level analysis. The Statement of Financial Accounting Standards No. 131 requires all publicly held companies to disclose the identities of their major customers representing more than 10% of their total sales. We extract the identities of the major customers of each firm from the Compustat Customer Segment Files. We then redo the analyses at the firm level by requiring at least a ten-year history, following Dou et al. (2013). We use $RD\_Supplier_{it}$ and $RD\_Customer_{it}$ to measure the dependence on suppliers and customers. $RD\_Supplier_{it}$ refers to the dependence on R&D of major suppliers, which is the median value of the R&D intensity of the firm's major suppliers in the given year. $RD\_Customer_{it}$ refers to the dependence on R&D of major customers, which is the median value of the R&D intensity of the firm's major customers in the year. R&D intensity is the ratio of R&D expense to total assets.

Table 10 shows the regression results. Because the definitions of the other variables are the same as those in Eqs. (3) and (4), we omit the interpretation of the variable definitions for parsimony. Panels A and B of Table 10 only consider the firm's dependence on suppliers and on customers, respectively. In Panel A, the coefficients on $CSR_{it} \times RD\_Supplier_{it}$ are significantly negative in columns (1) and (2) (−0.259 and −0.312, respectively). This suggests that firms with better CSR performance and greater dependence on suppliers exhibit lower levels of income smoothness. In Panel B, although the coefficient on $CSR_{it} \times RD\_Customer_{it}$ is statistically insignificant when $SMTH\_RATIO_{it}$ is the dependent variable, the coefficient on $CSR_{it} \times RD\_Customer_{it}$ is significantly negative when $SMTH\_CORR_{it}$ is the dependent variable. The results suggest that firms with better CSR performance and greater dependence on customers exhibit lower levels of income smoothness. As reported in Panel C, the results remain similar when we include both $RD\_Supplier_{it}$ and $RD\_Customer_{it}$ in the same regression model. Overall, the firm-level regression results are qualitatively similar to the main findings.

4.4.3. Other un-tabulated robustness checks

We also perform a series of un-tabulated robustness tests. First, we use the income smoothing measure from Tucker and Zarowin (2006). Tucker and Zarowin (2006) measure the level of income smoothness as the reversed fractional ranking of the correlation of a firm's change in discretionary accruals with its changes in pre-managed income based on the current year and the previous four-year observations. We use this measure of income smoothness and redo the analyses. The un-tabulated findings are qualitatively similar to the main findings.

Second, we control for market competition. It is possible that the relative power in the supply chain can determine one firm's impact on another in the supply chain. Therefore, we consider the degree of competition by including the industrial Herfindahl index based on the two-digit SIC Code. The industrial Herfindahl index is measured as the sum of the squared market shares of all the firms in an industry at the end of the year. The market share is measured by sales revenues. The un-tabulated findings are qualitatively similar to the main findings.

Third, we use an alternative instrumental variable and re-perform the two-stage regression analyses. Following Cheng, Ioannou, and Serafeim (2014), we use the median value of the CSR performance of the firm's industry peer firms in the given year as an instrumental variable based on the two-digit SIC codes. The rationale is that a firm's CSR performance is affected by a time-invariant component that is related to its membership in the industry. The un-tabulated findings remain consistent with those in the main analyses.

Fourth, we construct a firm's total CSR score following the procedure set forth in Kim et al. (2012) and redo the analysis. In the analysis, we exclude the corporate governance dimension score from the total CSR score and add it in the regression models as a control variable. The un-tabulated results remain qualitatively similar.

Fifth, we fill in the missing operating cash flow values with the estimates following the estimation procedure set forth in Kothari, Leone, and Wasley (2005). The un-tabulated results show that missing values for operating cash flow do not affect our findings.

Sixth, we focus on the CSR firms covered by KLD only after the year of 2001. The results remain qualitatively similar.

Seventh, the main findings remain robust when the total CSR score is not industry-adjusted. Finally, the results are robust when we use one-way clustering by year.

5. Conclusions

Although corporate social responsibility is gaining importance in the global community, its diffusion is subject to the supply chain relationship. Due to the uncertain costs and benefits of CSR projects, firms may not tune up their CSR budget until their supply chain partners are paying significant attention to CSR. Also, because earnings numbers are a key element leading to the building and maintaining of the supply chain relationship, firms may not reduce income smoothing unless their supply chain partners place less weight on earnings. In this study, we

Table 9
CSR strength and CSR weaknesses.

	(1)			(2)			(3)		
Variable	Coefficient	t-Value		Coefficient	t-Value		Coefficient	t-Value	
Panel A. Dependent variable: $SMTH\_RATIO_{it}$									
Intercept	−0.811	−39.55	***	−0.753	−24.13	***	−0.823	−38.93	***
$CSR\_Strength_{it}$	−0.040	−4.89	***	0.003	0.18		−0.028	−2.55	**
$CSR\_Concern_{it}$	0.014	1.43		−0.057	−2.56	**	0.045	3.40	***
RS_INPUT_{it}				−0.112	−5.02	***			
$CSR\_Strength_{it} \times RS\_INPUT_{it}$				−0.074	−2.44	**			
$CSR\_Concern_{it} \times RS\_INPUT_{it}$				0.056	1.46				
$RS\_SUPPLIER_{it}$							−3.239	−5.28	***
$RS\_CUSTOMER_{it}$							−0.425	−1.43	
$CSR\_Strength_{it} \times RS\_SUPPLIER_{it}$							−0.333	−0.31	
$CSR\_Concern_{it} \times RS\_SUPPLIER_{it}$							1.034	0.73	
$CSR\_Strength_{it} \times RS\_CUSTOMER_{it}$							−2.581	−3.86	***
$CSR\_Concern_{it} \times RS\_CUSTOMER_{it}$							0.136	0.16	
$LNASSETS_{it}$	0.003	1.14		0.002	0.67		0.012	4.04	***
LEV_{it}	0.185	8.13	***	0.263	9.00	***	0.207	8.97	***
BM_{it}	0.003	0.97		0.023	2.51	**	0.004	1.16	
STD_SALES_{it}	0.000	1.28		0.000	−0.52		0.000	2.11	**
$LOSS_{it}$	−0.525	−33.11	***	−0.559	−29.07	***	−0.557	−34.60	***
$OPCYCLE_{it}$	0.005	1.07		0.004	0.22		0.004	0.96	
SG_{it}	0.000	−1.03		−0.006	−2.86	***	0.000	−1.40	
$OPLEV_{it}$	0.042	2.54	**	0.019	0.80		0.056	3.44	***
CFO_{it}	−0.301	−9.07	***	−0.417	−10.64	***	−0.389	−11.63	***
Observations	26,798			17,019			25,850		
F-value	135.5	***		108.8	***		130.0	***	
Adj. R^2	0.09			0.08			0.08		
Panel B. Dependent variable: $SMTH\_CORR_{it}$									
Intercept	0.596	34.70	***	0.669	24.02	***	0.602	33.94	***
$CSR\_Strength_{it}$	−0.045	−6.68	***	−0.012	−0.71		−0.034	−3.70	***
$CSR\_Concern_{it}$	0.009	1.16		−0.037	−1.87	*	0.041	3.73	***
RS_INPUT_{it}				−0.088	−4.39	***			
$CSR\_Strength_{it} \times RS\_INPUT_{it}$				−0.055	−2.03	**			
$CSR\_Concern_{it} \times RS\_INPUT_{it}$				0.037	1.09				
$RS\_SUPPLIER_{it}$							−2.288	−4.44	***
$RS\_CUSTOMER_{it}$							−1.028	−4.11	***
$CSR\_Strength_{it} \times RS\_SUPPLIER_{it}$							−0.236	−0.26	
$CSR\_Concern_{it} \times RS\_SUPPLIER_{it}$							−0.241	−0.20	
$CSR\_Strength_{it} \times RS\_CUSTOMER_{it}$							−2.441	−4.37	***
$CSR\_Concern_{it} \times RS\_CUSTOMER_{it}$							0.936	1.31	
$LNASSETS_{it}$	0.002	0.84		−0.002	−0.62		0.008	3.25	***
LEV_{it}	0.160	8.39	***	0.251	9.63	***	0.172	8.88	***
BM_{it}	0.007	2.40	**	0.029	3.51	***	0.007	2.60	***
STD_SALES_{it}	0.000	1.25		0.000	0.10		0.000	2.70	***
$LOSS_{it}$	−0.583	−43.92	***	−0.669	−38.99	***	−0.612	−45.34	***
$OPCYCLE_{it}$	0.006	1.79	*	−0.031	−1.84	*	0.006	1.52	
SG_{it}	0.000	−1.07		−0.001	−0.37		0.000	−1.43	
$OPLEV_{it}$	0.033	2.42	**	0.008	0.38		0.037	2.70	***
CFO_{it}	−0.073	−2.61	***	−0.194	−5.54	***	−0.156	−5.58	***
Observations	26,798			17,019			25,850		
F-value	238.2	***		201.8	***		243.3	***	
Adj. R^2	0.14			0.14			0.14		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively.

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm *i* in year *t*, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. $CSR\_Strength_{it}$ represents the CSR strength score for firm *i* in year *t*, which is the sum of the firm's CSR strength scores divided by the total number of strength items within the same dimension-year, then adjusted by subtracting the industry median value of CSR of the year based on the two-digit SIC code. $CSR\_Concern_{it}$ represents the CSR weaknesses score for firm *i* in year *t*, which is the sum of the firm's CSR weakness scores divided by the total number of total items within the same dimension-year, then adjusted by subtracting the industry median value of CSR of the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm *i* in year *t*, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm *i* in year *t*, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm *i* in year *t*. LEV_{it} refers to total liabilities divided by total assets for firm *i* in year *t*. BM_{it} refers to book value of equity divided by market value for firm *i* in year *t*. STD_SALES_{it} refers to the standard deviation of sales for firm *i* in year *t*, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm *i* in year *t*. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm *i* in year *t*. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

Table 10
Firm-level supplier-customer relationship analysis.

Dependent variable	(1) $SMTH\_RATIO_{it}$			(2) $SMTH\_CORR_{it}$		
Variable	Coefficient	t-Value		Coefficient	t-Value	
Panel A: Dependence on suppliers						
Intercept	−0.483	−11.87	***	0.836	23.38	***
CSR_{it}	−0.018	−1.78	*	−0.014	−1.56	
$RD\_Supplier_{it}$	−0.043	−1.58		−0.076	−3.21	***
$CSR_{it} \times RD\_Supplier_{it}$	−0.259	−4.28	***	−0.312	−5.88	***
$LNASSETS_{it}$	−0.032	−6.44	***	−0.027	−6.35	***
LEV_{it}	0.255	5.90	***	0.299	7.87	***
BM_{it}	0.055	3.22	***	0.074	4.94	***
STD_SALES_{it}	0.000	2.95	***	0.000	2.67	***
$LOSS_{it}$	−0.736	−22.35	***	−0.747	−25.86	***
$OPCYCLE_{it}$	0.049	2.46	**	0.033	1.87	*
SG_{it}	0.001	0.16		0.006	1.24	
$OPLEV_{it}$	0.029	1.04		0.006	0.24	
CFO_{it}	−0.580	−6.36	***	−0.296	−3.69	***
Observations	7086			7086		
F-value	58.30	***		90.99	***	
Adj. R^2	0.09			0.13		
Panel B: Dependence on customers						
Intercept	−0.808	−20.48	***	0.651	20.28	***
CSR_{it}	−0.018	−1.27		−0.024	−2.05	**
$RD\_Customer_{it}$	−0.476	−2.61	***	−0.870	−5.86	***
$CSR_{it} \times RD\_Customer_{it}$	−0.359	−1.06		−0.618	−2.24	**
$LNASSETS_{it}$	0.000	0.07		−0.009	−1.84	*
LEV_{it}	0.278	6.56	***	0.223	6.46	***
BM_{it}	0.004	1.02		0.005	1.54	
STD_SALES_{it}	0.000	1.09		0.000	2.08	**
$LOSS_{it}$	−0.513	−18.35	***	−0.576	−25.29	***
$OPCYCLE_{it}$	0.011	1.95	*	0.010	2.08	**
SG_{it}	−0.002	−0.59		0.000	0.14	
$OPLEV_{it}$	0.028	0.91		0.057	2.27	**
CFO_{it}	−0.433	−7.65	***	−0.168	−3.64	***
Observations	8908			8908		
F-value	46.31	***		108.73	***	
Adj. R^2	0.06			0.13		
Panel C: Dependence on suppliers and on customers						
Intercept	−0.410	−4.50	***	0.935	11.85	***
CSR_{it}	0.007	0.32		0.009	0.44	
$RD\_Supplier_{it}$	−0.036	−0.91		−0.062	−1.79	*
$RD\_Customer_{it}$	−0.048	−0.15		0.036	0.13	
$CSR_{it} \times RD\_Supplier_{it}$	−0.245	−2.34	**	−0.290	−3.21	***
$CSR_{it} \times RD\_Customer_{it}$	−0.444	−1.07		−1.366	−3.82	***
$LNASSETS_{it}$	−0.046	−4.14	***	−0.048	−4.98	***
LEV_{it}	0.205	2.47	**	0.111	1.54	
BM_{it}	0.097	2.70	***	0.072	2.30	**
STD_SALES_{it}	0.000	2.94	***	0.000	4.39	***
$LOSS_{it}$	−0.786	−12.49	***	−0.699	−12.84	***
$OPCYCLE_{it}$	0.039	0.60		−0.009	−0.16	
SG_{it}	−0.001	−0.16		0.010	1.58	
$OPLEV_{it}$	0.047	0.81		0.167	3.32	***
CFO_{it}	−0.836	−5.25	***	−0.188	−1.36	
Observations	2179			2179		
F-value	15.59	***		27.95	***	
Adj. R^2	0.09			0.15		

***, **, and * are the two-tailed statistical significance at the one, five, and 10% levels, respectively.

$SMTH\_RATIO_{it}$ is the standard deviation of net income before extraordinary items divided by the standard deviation of cash flow from operations, scaled by average total assets, and then multiplied by negative one. Cash flow from operations = net income before extraordinary items − accruals = net income before extraordinary items − (the change in current assets − the change in cash + the change in current liabilities − depreciation expense − amortization expense). $SMTH\_RATIO_{it}$ is estimated using rolling time intervals requiring a minimum of three and a maximum of five years of data, following Lang et al. (2012). $SMTH\_CORR_{it}$ is the correlation between accruals and operating cash flow, scaled by total assets, and then multiplied by negative one. CSR_{it} refers to total CSR score for firm *i* in year *t*, which is the difference between the total CSR strength score and the total CSR weaknesses score for the year, then adjusted by subtracting the industry median value of the CSR_{it} for the year based on the two-digit SIC code. RS_INPUT_{it} refers to the importance of relationship-specific investments across industries for firm *i* in year *t*, estimated from Eq. (1). $RS\_SUPPLIER_{it}$ and $RS\_CUSTOMER_{it}$ refer to the dependence on R&D of supplier and customer industries for firm *i* in year *t*, estimated from Eqs. (2A) and (2B). $LNASSETS_{it}$ refers to the natural log of total assets for firm *i* in year *t*. LEV_{it} refers to total liabilities divided by total assets for firm *i* in year *t*. BM_{it} refers to book value of equity divided by market value for firm *i* in year *t*. STD_SALES_{it} refers to the standard deviation of sales for firm *i* in year *t*, using rolling time intervals requiring a minimum of three and a maximum of five years of data. $LOSS_{it}$ refers to the number of years that a firm experiences losses over the previous three to five years. $OPCYCLE_{it}$ refers to the natural log of operating cycle for firm *i* in year *t*. SG_{it} refers to the average sales growth over the previous three to five years. $OPLEV_{it}$ refers to net property, plant, and equipment divided by total assets for firm *i* in year *t*. CFO_{it} refers to average cash flow from operations divided by total assets measured over the last five years.

investigate how the supplier-buyer relationship affects the income-smoothing behavior of socially responsible firms. We find that firms engaging in more CSR with greater dependence on the supplier-buyer relationship are associated with lower levels of income smoothness. This finding implies that firms' CSR policy and income-smoothing behavior are subject to their supply chain relationship. In addition, we find that the market perceives the earnings of income smoothers having good CSR performance as less informative than those of other firms. Collectively, these findings imply that supply chain partners' demand for CSR affects both a firm's CSR policy and its income-smoothing behavior. More consensus among industries with respect to a greater focus on CSR and less focus on earnings is consistent with the interests of both shareholders and stakeholders. A caveat in this paper is that we recognize that the economic significance of the effect of CSR on income smoothing could be limited. Although CSR is merely one of the determinants of income smoothing, we believe it plays an important role in the capital market because it may provide incentives for firms to faithfully report their financial statements.

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