Stock Liquidity and Corporate Social Responsibility

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Abstract

We show that stock liquidity negatively affects firms' corporate social responsibility (CSR) ratings. To identify the causal effect, we use the decimalization of stock trading as an exogenous shock to liquidity. The negative liquidity effect on CSR is more pronounced for firms with CEOs approaching the retirement age, firms with more analyst coverage, or those with larger short-term institutional ownership. These findings suggest that stock liquidity induces managerial short-termism, thereby discouraging firms from engaging in CSR activities. Overall, our analysis reveals a dark side of stock liquidity in terms of exacerbating the conflict between shareholders and other stakeholders.

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1. Introduction

Corporate social responsibility (CSR hereafter) inherently requires a long-term perspective. Recent studies find that although implementing CSR activities does not create immediate benefits for shareholders (Wang and Bansal, 2012; Kecskes, Mansi, and Nguyen, 2016), the adoption of CSR is beneficial for shareholders in the long run because CSR, as an intangible corporate asset that aligns the long-term interest of other stakeholders with that of shareholders, accrues gains and increases firm value over the long-term (e.g., Russo and Fouts, 1997; Freeman, Wicks, and Parmar, 2004; Fatemi, Fooladi, and Tehranian, 2015; Starks, Venkat, and Zhu, 2017).[1] Anecdotes are also consistent with these findings. As Bruce Nolop writes for *The Wall Street Journal* (2014), "*While social responsibility may reduce the stock price over the short term, the price eventually may be higher due to the expected rewards in the future or the avoidance of risks that may threaten a company's long-term value or even its viability.*" Furthermore, according to McKinsey's survey in 2009,[2] approximately 30% of executives believe that CSR can increase shareholder value in the short run, whereas more than 70% of executives believe that CSR contributes to shareholder value in the long run.

In this paper, we examine whether and how stock liquidity, defined as the ability to trade a significant quantity of a firm's stock at a low cost in a short time, affects managers' decisions to engage in CSR. We are interested in stock liquidity because it is an important tool for shareholders to influence managers' decision horizon (Edmans, Fang, and Zur, 2013). In particular, prior studies suggest two distinctive views on the role of stock liquidity in affecting managers' horizon incentives. On the one hand, the governance view asserts that liquidity

[1] Prior literature also suggests that CSR accrues gains over the long term because it takes time to build intangible assets, such as social capital and reputation, as well as relationships with other stakeholders, which require organizational capabilities (Choi and Kim, 2016).
[2] Valuing corporate social responsibility: McKinsey Global Survey Results (2009).

enhances the intervention of blockholders on managers by facilitating the formation of blocks (Kyle and Vila, 1991; Kahn and Winton, 1998; Maug 1998), accelerating impounding value enhancement from the intervention into stock price (Faure-Grimaud and Gromb, 2004), and reinforcing blockholders' exit threat of selling shares (Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2011; Edmans, Fang, and Zur, 2013), which provides managers with incentives to take actions that increase the long-term firm value. On the other hand, the short-termism view maintains that liquidity attracts short-term institutional investors because it allows these investors to dump their stake with low costs (Coffee, 1991; Bhide, 1993). The pressure from these short-term investors to deliver short-term performance induces managerial short-termism to inflate the stock price in the short run (Stein, 1988, 1989).[3]

Building on the abovementioned studies, we posit two competing hypotheses concerning the impact of stock liquidity on firms' CSR activities. Specifically, the governance view maintains that stock liquidity encourages firms' CSR activities because more liquid stocks promote the formation of blockholders who are likely to be long-term oriented and exert governance influence (Ferrell, Liang, and Renneboog, 2016), which induces the alignment of managers' interest with that of shareholders in the long run. Given that CSR investment increase long-term shareholder wealth, the governance view predicts a positive impact of stock liquidity on firms' CSR activities. In contrast, the short-termism view posits that liquidity impedes firms' CSR investment because liquidity attracts short-term institutional investors, who are likely to pressure managers to deliver short-term performance by focusing on short-term corporate strategies. As such, the short-termism view predicts a negative effect of stock liquidity on firms' CSR activities.

[3] Refer to Porter (1992); Fang, Tian, and Tice (2014); and Chang, Chen, and Zolotoy (2016) for an explanation on how liquidity induces managerial short-termism in corporate policies.

Using a sample of 21,783 firm-year observations with CSR ratings from 1995 to 2013, we empirically investigate how stock liquidity affects firms' CSR activities. Similar to previous studies (Waddock and Graves, 1997; Deng, Kang, and Low, 2013; Flammer, 2015), we measure firms' CSR activities using their CSR ratings in terms of product quality, diversity, human rights, employee relations, environment, and community, which are collected from the Kinder, Lydenberg, and Domini Research & Analytics (KLD) database. Following prior studies (e.g., Fang, Noe, and Tice, 2009; Fang, Tian, and Tice, 2014; Chang, Chen, and Zolotoy, 2016; Chen et al., 2017), we measure stock liquidity using the relative effective spread.

Consistent with the short-termism view, our main results show that firms with higher stock liquidity have lower CSR ratings. The negative association between stock liquidity and CSR performance is both statistically and economically significant. Specifically, a one-standard-deviation increase in stock liquidity, on average, decreases firms' CSR ratings by 7%. We conduct various checks to ensure that our main findings are robust to alternative variable definitions and model specifications.

The negative association between stock liquidity and CSR activities does not itself establish a causal influence of stock liquidity on CSR activities. It is plausible that stock liquidity and firms' CSR activities are endogenously determined by some omitted variables (the omitted bias), or the causal relation between stock liquidity and CSR activities is bidirectional (the reverse causality bias). To address these concerns, we employ the decimalization of stock trading in 2001 as a natural experiment. The NYSE, AMEX, and NASDAQ started to implement an increment in quoting and trading stocks from one-sixteenth to decimals in 2001, which comes as a positive shock to stock liquidity (Fang, Noe, and Tice, 2009). Prior literature has shown that the decimalization of stock trading generally improves the stock liquidity of all firms listed on

NYSE, AMEX, and NASDAQ (Chordia, Roll, and Subrahmanyam, 2008), but has a disproportionally larger impact on low-priced stocks (Edmans, Fang, and Zur, 2013).

Given these findings, we develop four empirical strategies to mitigate the potential endogeneity issues using the decimalization event. First, we follow Fang, Noe, and Tice (2009) and examine how firms' CSR ratings change in response to the change in liquidity from the year prior to the decimalization to the year after the decimalization. We find that the exogenous increase in liquidity caused by the decimalization, on average, leads to a significant decrease in CSR ratings. Second, to take advantage of the disproportional effect of the decimalization event on high- versus low-priced stocks, we employ a difference-in-differences (DiD) approach by comparing the change of firms' CSR ratings before and after this event between firms with high-priced and low-priced stocks. We find that the CSR ratings of firms with low-priced stocks experience a significant decline after the decimalization relative to firms with high-priced stocks. Third, to substantiate the forward causality from stock liquidity to firms' CSR investment, we follow Bertrand and Mullainathan (2003) and examine the dynamics of firms' CSR rating differentials around the decimalization. We find that differentials of firms' CSR ratings between high-priced and low-priced firms appear only after the decimalization. Finally, to alleviate the concern that firms' heterogeneity prior to the decimalization may drive the results, we follow Fang, Tian, and Tice (2014) and construct a matched sample with two groups, where we require that firms share similar characteristics before the decimalization but experience different levels of liquidity improvement prior to the decimalization. We then compare the change in CSR ratings for firms experiencing a larger liquidity improvement surrounding the decimalization (the treatment group) and that for firms experiencing a smaller liquidity improvement (the control group), and find a significant larger increase in CSR ratings for firms in the treatment group

relative to those in the control group. Collectively, our tests of endogeneity point to a causal impact of stock liquidity on firms' CSR performance, although we cannot completely rule out endogeneity as a potential confounding factor.

Next, we explore the cross-firm heterogeneity in the negative effect of stock liquidity on firms' engagement in CSR activities. Prior studies document that managers are more prone to myopia when they approach the retirement age (Gibbons and Murphy, 1992; Jenter and Lewellen, 2015), when their firms are followed by more analysts (He and Tian, 2013), or when their firms are held by short-term institutional investors (Bushee, 1998). To the extent that liquidity induces managerial short-termism in CSR investment, the negative effect of liquidity on CSR should be more pronounced for firms with retiring CEOs, with more analyst coverage, or with higher short-term intuitional ownership. To test this implication, we interact stock liquidity with indicators denoting the approach of retirement age, more analyst coverage, and higher short-term institutional ownership, and examine how the liquidity effect on CSR varies according to these characteristics. We find that the liquidity effect is indeed more pronounced for firms where CEOs are closer to retirement, firms with more analyst coverage, and firms with higher short-term institutional ownership. Moreover, as auxiliary evidence to the short-termism channel, we show that an exogenous increase in stock liquidity due to the decimalization increases the holding by short-term and non-dedicated institutional investors but not long-term institutional investors. These results further confirm the short-termism view of stock liquidity in explaining its negative impact on firms' CSR activities: stock liquidity exacerbates managers' short-horizon incentives and induces them to cut CSR investment, which can be costly for shareholders in the short run but beneficial in the long run. They also reveal the negative role of stock liquidity in

exacerbating the conflict between shareholders and other stakeholders by reducing firms' CSR commitments.

Finally, we explore the effect of stock liquidity on six different dimensions of CSR ratings, respectively. We find that the negative impact of stock liquidity is significant on five dimensions: product quality, human rights, employee relations, and the environment. These findings suggest that the adverse impact of stock liquidity on firms' CSR activities is extensive rather than concentrated in any particular aspect. We further investigate the real effect of stock liquidity on CSR performance by examining the firm's pollution prevention. Using the data provided by the Toxic Release Inventory (TRI) program under the United States Environmental Protection Agency[4] and the Compustat Industrial Annual files, we obtain the pollution prevention amount, which includes the aspects of the total waste produced and, the amounts of individual chemicals produced. We find that the stock liquidity negatively affects firm's pollution prevention performance.

Our study contributes to the existing literature in two ways. First, our paper adds to the literature on the determinants of CSR. Prior studies identify various factors affecting firms' CSR activities, such as foreign competitive threat (Flammer, 2015), institutional ownership (Erhemjamts and Huang, 2016), and legal origin (Liang and Renneboog, 2017). We extend this line of literature by demonstrating that stock liquidity, as an important stock market characteristic, induces managerial short-termism, thus impeding firms' CSR performance. This finding suggests an important perspective for policymakers who are interested in cultivating CSR in Corporate America.

[4] The database is, by far, the most comprehensive database about waste production and releases by operating facilities in the United States. In this paper, we compute a firm's total waste produced (in pounds) in all facilities.

Second, our study contributes to the ongoing debate on the effects of stock liquidity. Some studies show that liquidity improves corporate governance by encouraging the voice of blockholders (Kyle and Vila, 1991; Kahn and Winton, 1998; Maug 1998) or imposing an exit threat (Edmans, 2009; Edmans and Manso, 2011), while other studies reveal a dark side of liquidity because it allows institutional investors, in particular short-term institutional investors, to sell their stakes of firms in trouble without making efforts in monitoring (Coffee, 1991; Bhide, 1993). We demonstrate that stock liquidity can exacerbate managerial short-termism, thereby discouraging firms' CSR investment. In doing so, our paper complements Fang, Tian, and Tice (2014) in uncovering the unfavorable feature of stock liquidity in hindering firms' investment that can be beneficial for shareholders in the long run.

The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the data, the sample, and the variable construction. The main empirical results are presented in Section 4. Further analysis is reported in Section 5. Section 6 concludes.

2. Related literature

Our paper contributes to two strands of literature. The first strand of literature emphasizes the effect of stock liquidity on corporate policies, whereas the second strand of literature focuses on the determinants of CSR.

2.1. Stock liquidity and corporate policies

Multiple views exist on the process through which stock liquidity affects firms' governance and managerial incentives. On the one hand, Maug (1998) argues that, as a result of lower trading costs, higher stock liquidity enables the blocks to form at ease, which helps improve the monitoring by shareholders. Faure-Grimaud and Gromb (2004) show that liquidity enhances blockholders' monitoring by allowing these investors to enjoy gains from intervention, which

can be quickly impounded into the stock price. Consistent with the governance argument, Fang, Noe, and Tice (2009) show that stock liquidity enhances firm value because liquidity improves the feedback efficiency from investors to managers and the efficiency of equity-based compensation through price. Norli, Ostergaard, and Schindele (2015) document that stock liquidity helps overcome the free-rider problem, thus increasing the probability of shareholder activism. Brogaard, Li, and Xia (2017) find that stock liquidity significantly reduces firm bankruptcy risk by improving stock price informational efficiency and corporate governance. Chen et al. (2017) show that firms with high liquidity are less likely to engage in extreme tax avoidance as such a practice enhances shareholders' monitoring over the management.

On the other hand, Coffee (1991) and Bhide (1993) argue that liquidity reduces the trading costs of selling stocks of firms in trouble. As a result, liquidity does not improve firms' governance but exacerbates managers' short-termism. In line with this short-termism argument, Fang, Tian, and Tice (2014) find that liquidity impedes corporate innovation by increasing the exposure to takeover market and the trading pressure from short-term institutional investors. Kang and Kim (2015) show that, in firms with higher transient institutional ownership, higher liquidity leads to higher CEO turnover. Chang, Chen, and Zolotoy (2016) find that liquidity increases firms' stock price crash risk as it induces managers to inflate short-term earnings by withholding bad news.

There is a third view presented by Admati and Pfleiderer (2009), Edmans (2009), and Edmans and Manso (2011), who argue that the exit threat by blockholders also improves firms' governance because managers' equity-based compensation can be adversely affected ex-post by investors' selling. The study of Edmans, Fang, and Zur (2013), which examines the effect of liquidity on corporate governance, finds supportive evidence to this view.

Taken together, the evidence on how stock liquidity affects managerial incentives is mixed. Our study adds to this debate by documenting that stock liquidity leads to managerial myopia, which in turn, has a detrimental impact on firms' CSR.

2.2. Determinants of CSR

Extant studies have identified various factors affecting CSR. For example, Flammer (2015) shows that competitive threats from foreign rivals encourage domestic firms' engagement in CSR; this is because these firms treat CSR as a strategy to maintain their comparative advantage. Dimson, Karakas, and Li (2015) show that socially responsible institutional investors are more likely to target firms for CSR. Erhemjamts and Huang (2016) find that long-term (short-term) institutional investors promote (discourage) CSR as a long-term investment that increases firm value. The analysis of Liang and Renneboog (2017) shows the importance of country-level legal origin in explaining the cross-country difference in CSR strategies. In addition, Di Giuli and Kostovetsky (2014) find that politics plays an important role in firms' CSR investment. Hong, Kubik, and Scheinkman (2012) document financial constraints as an important reason why firms do not engage in CSR.

Despite these factors, to the best of our knowledge, no research has yet to investigate how stock market characteristics affect CSR activities. Our study fills the literature gap by documenting the adverse impact of stock liquidity, as a key stock market characteristic, on firms' CSR investment. By doing so, our analysis offers new insights into the determinants of firms' investment in CSR and highlights the real effect of stock market characteristics.

3. Data, sample, and variables

3.1. Data and sample selection

We extract CSR data from Kinder, Lydenberg, and Domini Research & Analytics (KLD)

database, which tracks firms' CSR ratings since 1991. We obtain liquidity data from the Trade and Quote database (TAQ), stock return data from Center for Research in Security Prices (CRSP), firm financial data from Compustat, analyst coverage data from Institutional Brokers Estimates Systems (I/B/E/S), institutional holdings data from Thomson Reuter's Institutional Holdings database, institutional investor classification data from Brian Bushee's website,[5] and managerial compensation data from Compustat Executive Compensation (ExecuComp).

Our sample includes firm-year observations jointly covered by KLD, Compustat, CRSP, and TAQ. Since we follow Bae et al. (2017) and require a minimum of four observations of non-missing CSR ratings for a given industry-year, our sample starts from 1995.[6] Our sample ends in 2013 because of the availability of stock liquidity data. Firm-years with missing values for variables in our main regression are excluded. Our final sample consists of 21,783 firm-year observations from 1995 to 2013. Table A2 in the Appendix shows the sample distribution by year. The number of sample firms is steady around 300 from 1995 to 2000 before increasing to 480 in 2001 and 533 in 2002. Because the KLD database covers approximately 650 companies in the Domini 400 Social SM Index, Standard & Poor's (S&P) 500 since 1991, and starts to include firms in the Russell 3000 since 2003, we find an increase in the number of observations since 2002 to 2003. The number of firms in each year after 2003 becomes fairly stable at around 1,300 to 1,900.

3.2. Measuring corporate social responsibility

[5] http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

[6] The number of CSR strength in the human rights dimension is zero from 1991 to 1993 for each firm-year observation. Hence, CSR measures defined as described in Section 3.2 are missing during this period, which makes the CSR data starting in 1994. We forward CSR data by one year in the baseline regression, so our final sample starts in 1995.

We follow prior CSR literature (e.g., Flammer, 2015) and measure a firm's CSR performance using the strength score from the KLD database, which reflects the extent of the firm's involvement in CSR activity. KLD rates firms along six dimensions, namely product quality and safety, diversity, human rights, employee relations, environment, and community.[7] In each dimension, KLD provides both strength (positive CSR policy) indicators and concern (negative CSR policy) indicators. Our primary CSR measure (*CSR*) is defined as the sum of the strength scores in the above-mentioned six dimensions. A higher value of *CSR* indicates a better social performance.

Moreover, we construct four alternative *CSR* proxies. Specifically, we first define a net KLD index that considers both CSR strengths and concerns (*CSR_net*), which is calculated as the difference between strength scores and concern scores. Second, we define a CSR measure that takes corporate governance into consideration in addition to *CSR* (*CSR*7). Third, we follow Deng, Kang, and Low (2013) and define an adjusted CSR score (*CSR_adj*) by dividing the strength and concern scores for each dimension by the respective number of strength and concern indicators to derive adjusted strength and concern scores for that dimension and then taking the difference between the adjusted total strength score and the adjusted total concern score. Fourth, we define a CSR concern measure as the sum of total concerns scores of the six dimensions (*CSR_con*). We provide a more detailed discussion of these alternative *CSR* measures in Section 4.2.

3.3. Measuring stock liquidity

[7] KLD also rates firms along the corporate governance dimension. As it is different from corporate social responsibility, we exclude this dimension in computing our primary measure of CSR. In the robustness check, we use an alternative measure of CSR, which sums up all strengths of seven dimension (including corporate governance dimension), and obtain similar results.

Our primary measure of liquidity is the relative effective spread calculated using the intraday TAQ data, which is generally perceived as one of the best liquidity measures because it is constructed based on the realized high-frequency trading data (e.g., Fang, Noe, and Tice, 2009; Fang, Tian, and Tice, 2014). The effective spread is often used as a benchmark in previous literature (e.g., Hasbrouck, 2009; Goyenko, Holden, and Trzcinka, 2009) to assess the performance of other liquidity measures calculated using low-frequency price and volume data.

The relative effective spread is defined as the difference between the execution price and the midpoint of the prevailing bid-ask quote, i.e., the effective spread, divided by the midpoint of the prevailing bid-ask quote. The daily relative effective spread for the stock of a given firm is the trade-weighted average of the relative effective spreads of all trades for a given stock during the day, as per TAQ. The annual relative effective spread is then calculated by averaging the daily spreads over the firm's fiscal year. Given that a higher value of relative effective spread indicates lower stock liquidity, we define stock liquidity, *LIQ*, as the annual relative effective spread multiplied by -100 to facilitate interpretation. As a result, a higher value of *LIQ* implies higher stock liquidity.

Apart from *LIQ*, we also consider the following three alternative measures of stock liquidity: Amihud's (2002) price impact measure (*Amihud ILLIQ*), Lesmond's (2005) percentage of zero daily returns measure (*ZERO*), and quoted bid-ask spread (*Quoted spread*). We discuss these alternative stock liquidity measures in greater details in Section 4.2.

3.4. Control variables

We control for a battery of firm-specific conditions that might influence firms' CSR according to prior literature (e.g., Brammer and Millington, 2005; Di Giuli and Kostovetsky, 2014; Ferrell, Liang, and Renneboog, 2016; Liang and Renneboog, 2017). Specifically, we

include firm size, defined as the natural logarithm of total asset (*Size*) because larger firms are more likely to engage in CSR activities. To capture the "doing good by doing well effect" as in Liang and Renneboog (2017), we include return on assets (*ROA*) as a proxy for firms' operating performance. We also control for firms' growth opportunity by including the market-to-book ratio (*MB*). Other control variables include the leverage ratio (*Leverage*), the cash-to-assets ratio (*Cash/Asset*), capital expenditure over total assets (*Capex/Asset*), analyst coverage (*Analyst*), and R&D expenses over total assets (*R&D/Asset*). Detailed definitions of these variables are presented in Table A1 in Appendix A.

3.5. Descriptive statistics

We report the summary statistics of the main variables in Panel A of Table 1. The average CSR score of our sample firms is 1.232. Our main measure of liquidity (*LIQ*), has a mean value of –0.196 and a standard deviation of 0.340. The average firm in our sample has a leverage ratio equals to 0.474. Table 1 also reports the summary statistics for other control variables. Since our sampling approach and variable construction criteria follow the literature, in the interest of brevity, we omit the discussion of the descriptive statistics for control variables.

[Insert Table 1 about here]

In Panel B, we present the correlation matrix. We find that *CSR* is positively correlated with *Size* and *ROA*, consistent with previous findings that larger and more profitable firms are more likely to invest in CSR. However, the correlation between *CSR* and *LIQ* is positive, which can be driven by the increasing time trends of both stock liquidity and firms' CSR investment over the time. Nevertheless, the positive correlation would bias against us finding the negative relation between stock liquidity and CSR. Nevertheless, the above results only reveal unconditional

relations. To uncover the more refined conditional effect of stock liquidity on CSR activities, more rigorous multivariate tests are required, which we turn to next.

4. Main findings

4.1. The baseline model

In this section, we perform multivariate regression analyses to examine the effect of stock liquidity on firms' CSR performance. The baseline regression model can be written as follows:

$$CSR_{i,t+1} = \beta_0 + \beta_1 LIQ_{i,t} + \gamma Y_{i,t} + \delta Firm_i + \theta Year_t + \varepsilon_{i,t}, \quad (1)$$

where $CSR_{i,t+1}$ represents the CSR ratings for firm i in year t+1. The key independent variable is $LIQ_{i,t}$, which equals the annual relative effective spread times -100 for firm i during year t. β_1 captures the liquidity effect on firms' CSR performance. Y is the set of control variables described in Section 3.4. All control variables are measured at t in the regressions. We include firm fixed effects to control for the impact of unobservable time-invariant firm characteristics. Year fixed effects are included to account for the aggregate time variation in CSR activities. The t-statistics reported are based on standard errors that are corrected for heteroskedasticity and are clustered at the firm level. Our conclusions are not affected if we allow clustering by both firm and year.

We present the baseline regression results in Table 2. Column (1) reports the results obtained by estimating the baseline model in Eq. (1) without any control variables. As shown in column (2), the coefficient of *LIQ* on CSR rating is still negative and significant at the 1% level after controlling for a set of control variables, suggesting that firms with more liquid stocks are associated with a lower CSR rating. In terms of economic significance, a one-standard-deviation increase in stock liquidity (i.e., 0.340) is associated with a 0.340×0.258 = 0.088 decrease in the CSR score, which is approximately 7.1% of the sample mean of CSR score (i.e., 1.232). Thus,

the effect of stock liquidity on firm CSR is not only statistically significant but also economically meaningful.

[Insert Table 2 about here]

The signs of coefficients of control variables are largely consistent with the prior literature (e.g., Di Giuli and Kostovetsky, 2014). For example, the CSR score is positively associated with firm size and cash holdings, but negatively correlated with the market-to-book ratio. Untabulated tests show that the largest variance inflation factor (VIF) is below 5, suggesting that multicollinearity is not severe issue in our setting (O'Brien (2007)).

Taken together, our baseline results in Table 2 suggest that firms with more liquid stocks exhibit weaker CSR performance. The significant negative relation between stock liquidity and CSR is consistent with the short-termism view that stock liquidity induces managerial myopia, which in turn, reduces companies' engagement in CSR activities.

4.2. Robustness tests

To ensure the validity of our results, we conduct a battery of robustness checks using the model in Column (1) of Table 2 on alternative measures of CSR and stock liquidity. Table 3 presents the results of these robustness checks. We only tabulate the coefficients of stock liquidity, our key explanatory variable, for the sake of brevity.

We begin by considering several alternative measures of CSR. First, besides the strength indicators for the six dimensions in the KLD database, we consider the concerns indicators as well and construct CSR concerns score (*CSR_con*). Moreover, we construct the net *CSR* score (*CSR_net*) by subtracting the concerns from strengths (e.g., Servaes and Tamayo, 2013; Di Giuli and Kostovetsky, 2014). Second, we add back the strength score of the seventh dimension in KLD (corporate governance) to obtain another *CSR* strength score (*CSR*7). Third, we construct

the adjusted *CSR* score (*CSR_adj*) to overcome the issues of time-varying number of strength and concern indicators for each dimension over time, which is mentioned in Deng, Kang and Low (2013). Specifically, the adjusted *CSR* score is calculated by dividing the strength and concern scores for each dimension by the respective number of strength and concern scores for that dimension, and then taking the difference between the adjusted total strength score and the adjusted total concern score. We replace *CSR* with these alternative measures in Eq. (1) and re-estimate the regressions. The results are presented in Panel A of Table 3. We find stock liquidity has a negative and significant on all alternative CSR measures except *CSR_con* in columns (1), suggesting that our findings are robust to alternative measures of CSR. One possible explanation for insignificant result on CSR concerns may be that concerns are usually related to the nature of the business thus it is less likely to be affected by stock market characteristics.

Next, we examine whether our results are sensitive to different measures of stock liquidity. We consider the following three alternative measures of stock liquidity, which are often used in prior literature, such as Amihud's (2002) price impact measure, Lesmond's (2005) percentage of zero daily returns measure, and relative quoted spread defined using the CRSP daily file.[8] We replace *LIQ* in Eq. (1) and re-estimate the regressions. The results are reported in Panel B of Table 3. Given that the three alternative stock liquidity proxies measure illiquidity, larger values indicate lower levels of stock liquidity. Consistent with our baseline findings, the coefficient estimates of all three alternative measures are negative and significant at the 5% level, suggesting that our findings are robust to different measures of stock liquidity.

[8] In particular, Amihud's (2002) illiquidity measure captures the stock price changes per $ millions of trading volume. The percentage of zero daily returns refers to the number of trading days with zero daily returns and positive trading volume, divided by the number of annual trading days over the firm's fiscal year. The relative quoted spread is calculated as the quoted bid-ask spread, divided by the midpoint of bid and ask price using CRSP daily file.

[Insert Table 3 about here]

Finally, considering the long-term nature of CSR investment, we measure stock liquidity in year *t*-1 and *t*-2 (LIQ_{t-1} and LIQ_{t-2}), respectively, instead of year *t* in Eq. (1). We then re-estimate the regressions and present the results in Panel C of Table 3. The coefficient estimates of LIQ_{t-1} and LIQ_{t-2} continue to be negative and significant at the 1% level. The results suggest that our findings are robust to accounting for the possibility of delayed response of CSR investment to stock liquidity.

4.3. Endogeneity

While we aim to document a causal influence of stock liquidity on CSR, the results could be subject to endogeneity arising from omitted variables or reverse causality running from CSR to stock liquidity. To address these concerns, we employ the decimalization of stock trading in 2001 as a natural experiment.[9] Before 2001, the minimum tick size for quoting and trading a stock is one-sixteenth of $1 on the three major U.S. exchanges. On January 29, 2001, the NYSE and AMEX started to reduce the minimum tick size, and to quote and trade all listed stocks in decimals. Since April 9, 2001, the NASDAQ also implemented the same change. Prior literature (e.g., Bessembinder, 2003; Chordia, Roll, and Subrahmanyam, 2008) shows that the decimalization of stock trading in 2001 in general lowers the cost of trading and increases liquidity of all stocks. Moreover, some studies (e.g., Edmans, Fang, and Zur, 2013) also find that the decimalization event has a disproportionally larger impact on low-priced stocks because moving from $1/16 to $1/100 is a greater proportional change for low-priced stocks relative to high-priced stocks.

[9] The decimalization has been widely used in the prior literature to establish causal links between variables (e.g. Fang, Noe, and Tice, 2009; Fang, Tian and Tice, 2014; Chang, Chen, and Zolotoy, 2016; Brogaard, Li, and Xia, 2017).

Based on these findings, we believe that the decimalization event in 2001 can serve as a good quasi-natural experiment for us to identify the causal impact of stock liquidity on CSR because (1) the decimalization generates an exogenous positive shock to stock liquidity but does not likely to directly affect firms' CSR activities, (2) high- and low-priced stocks seem to experience different levels of improvement in stock liquidity in the decimalization process, which allows us to explore the differentials in CSR performance surrounding the decimalization across high-priced and low-priced firms, and (3) the clear timing of the decimalization also helps us detect the reverse causality, which predicts a change in firms' CSR prior to the decimalization.

Accordingly, we develop four empirical strategies to mitigate the potential endogeneity issues using the decimalization event. We first follow Fang, Noe, and Tice (2009) and examine how firms' CSR ratings change in response to the change in liquidity from the year prior to the decimalization to the year after the decimalization by regressing the change in CSR rating on the change in liquidity from the fiscal year prior to decimalization to the fiscal year after decimalization. The results are reported in Panel A of Table 4. We find that an increase in liquidity caused by the decimalization result in a decrease in firms' CSR rating, confirming that firms adjust their CSR investment in response to the positive liquidity shock.

However, a potential drawback of this approach is that, despite unlikely, firms' CSR performance may decline over time. To overcome this issue, we take advantage of the disproportional effect of the decimalization on high- versus low-priced stocks, and employ a DiD approach by comparing the change of firms' CSR ratings before and after this event between firms with high-priced and low-priced stocks. In doing so, we create two binary variables that denote the timing of the decimalization (*Post*) and high- versus low-priced stocks (*LowPrc*), respectively. Specifically, *Post* takes the value of one for the fiscal year after the decimalization

and zero in the decimalization year or prior to it, and *LowPrc* takes the value of one if the firm's stock price in the pre-decimalization year is below the sample median, and zero otherwise. We then replace *LIQ* in Eq. (1) with *Post*, *LowPrc*, and the interaction of *Post* and *LowPrc* (*Post* × *LowPrc*) and re-estimate the regressions as in Eq. (2) below:

$$CSR_{i,t} = \beta_0 + \beta_1 Post_t + \beta_2 LowPrc_i + \beta_3 Post_t \times LowPrc_i + \gamma Y_{i,t} + \delta Firm_i + \theta Year_t + \varepsilon_{i,t}, \quad (2)$$

where our key variable of interest is β_3, the coefficient estimate of *Post*×*LowPrc*, which captures the different impact of the decimalization on high-priced versus low-priced stocks. Given a larger impact of the decimalization on liquidity improvement of low-priced stocks, we expect to find a negative and significant coefficient estimate of *Post*×*LowPrc*.

Following Fang, Tian and Tice (2014), we focus on a seven-year subsample surrounding the decimalization (year *t*) from year *t*-3 to year *t*+3 to perform the DiD analysis. A short window allows us to better control for the impact of unobserved variables as significant changes in those variables are less likely to happen during a short window.

We report the results in column (1) of Panel B of Table 4. Consistent with our conjecture, we find that the coefficient estimate of *Post*×*LowPrc* is negative and significant at the 5% level, suggesting that the decrease in CSR activities surrounding decimalization is indeed more pronounced for firms with low stock prices.

Third, to further substantiate the forward causality from stock liquidity to firms' CSR investment, we follow Bertrand and Mullainathan (2003) and examine the dynamics of a firm's CSR performance around the decimalization. In particular, we modify Eq. (2) by including the year dummies and their interactions with *LowPrc* around the decimalization. We use $Before^{-1}$ as a dummy variable equals one if it is one year before decimalization and zero otherwise. *Current*

is a dummy variable equals one if it is the decimalization year and zero otherwise. $After^{1}$ ($After^{2\&3}$) are dummy variables that take a value of one if it is one year (two or three years) after decimalization. The omitted group (benchmark) consists of the observations made two or three years before decimalization. This result is presented in column (2) of Table 4 Panel B. We observe the statistically insignificant coefficients for $LowPrc \times Before^{-1}$ and $LowPrc \times Current$, suggesting that the parallel trend assumption for the DiD is not violated. The coefficients of the interactions between *LowPrc* and $After^{1}$ ($After^{2\&3}$) are negative and significant, indicating that firms with low-priced stocks, compared with those with high-priced stocks, experience a larger decline in CSR following the decimalization. These results mitigate the concern that the causality may move in the opposite direction from CSR to liquidity.

[Insert Table 4 about here]

Finally, to alleviate the concern that firms' heterogeneity prior to the decimalization may drive the results, we employ an additional DiD identification strategy and compare the change in firms' CSR rating for two groups of firms that look similar except that they experience a significantly different change in liquidity surrounding decimalization. This DiD setting controls for the impact of omitted and unobserved variables and removes biases driven by time trends. Following prior literature (e.g., Fang, Tian, and Tice, 2014; Brogaard, Li, and Xia, 2017), we achieve this task by constructing a treatment group and a control group using propensity score matching. We rank all firms based on the liquidity change of their stocks around the decimalization, and assign them into terciles. We only retain the firms in the top and bottom terciles.

A probit model is estimated in which the dependent variable is one for firms in the first tercile and zero for firms in the third tercile, together with *LIQ* and the same set of control

variables measured in the pre-decimalization year (2000). For each firm in the top tercile (firms with the largest increase in liquidity), we use the predicted probabilities (propensity scores) to find a matching firm from the bottom tercile. By implementing this method, we obtain a matched sample with a treatment group and a matched control group, in which firms should share similar firm characteristics and liquidity prior to the decimalization, but experience a different change in liquidity in response to the exogenous shock of the decimalization.[10]

To compare the change in CSR ratings for the treatment group and the control group before and after the decimalization, we create an indicator to distinguish between the treatment group versus the control group (*Treat*), which takes the value of one if a firm is in the treatment group constructed as above, and zero if a firm is in the control group. We replace *LowPrc* with *Treat* in Eq. (2). We report the regression results based on the matched sample in Panel C of Table 4. In column (1), the coefficient estimate of *Treat* × *Post* is negative and statistically significant at the 1% level. We show the CSR dynamic in column (2) as well. Consistent with the results in Panel B of Table 4, the insignificance of the interaction terms *Treat* × *Before*$^{-1}$ and *Treat* × *Current* again mitigate the reverse causality concern in that the liquidity effect only started to appear after the liquidity shock. The coefficients on *Treat* × *After*^{1} and *Treat* × *After*$^{2\&3}$ are significantly negative, suggesting that treatment firms (i.e., highest increase in liquidity) experienced a larger decline in CSR ratings than control firms after the decimalization. Since this DiD approach is

[10] To ensure quality of matching, we follow Fang et al (2014) to perform two diagnostic analyses and report the results in Appendix B. First, we rerun the probit regression for the post-matched sample measured at the pre-decimalization year and report the result in column (2) of Panel A. All the explanatory variables are insignificant, suggesting that no different observable firm characteristics exist between our treatment firms and matched control firms. Second, we perform two sample *t*-tests on firms' pre-decimalization characteristics between treatment firms and control firms and report the result in Panel B. Panel B of Appendix B shows no statistically significant differences of firms' characteristics between the treatment group and the control group that affect firm's CSR. Moreover, the two groups have a similar level of liquidity prior to decimalization, even if the decimalization affects them differently. The diagnostic tests suggest that the propensity score matching method is able to reduce the potentially confounding firm differences known to affect CSR, helping to alleviate concerns that the results are driven by general time trends.

performed on a matched sample where firms' characteristics are similar between the treatment group and the control group, it further alleviates the concern that the liquidity-CSR relation is driven by omitted or unobservable variables. In sum, these findings suggest a negative causal relation running from stock liquidity to CSR.

5. Further analyses

5.1. Cross-sectional heterogeneity

Our baseline results suggest that higher stock liquidity leads to weaker CSR performance, which is consistent with the view that stock liquidity exacerbates managerial short-termism. In this section, we further explore the cross-firm heterogeneity in the negative effect of stock liquidity on firms' engagement in CSR activities by examining how this negative effect varies according to various firm and manager characteristics.

5.1.1. The presence of different types of institutional ownership

Chen, Dong and Lin (2016) show that institutional investors play a role in firms' CSR investment decisions. Increased liquidity makes the selling of stocks easier and less costly, which in turn, attract short-term and transient institutional investors (e.g., Fang, Tian, and Tice, 2014).[11] The presence of the short-term investors exerts pressure on managers to meet short-term performance targets and focus more on short-term corporate strategies. To the extent that CSR is a long-term investment, the short-term-focused managers are less likely to engage in CSR activities, which do not meet these managers' short-term targets. Thus, if short-term institutional investors play an important role in shaping the negative liquidity-CSR relation, we should

[11] Fang, Tian, and Tice (2014) show that transient institutional ownership increased for a group of firms that experienced the largest increase in stock liquidity surrounding decimalization, whereas transient institutional ownership dropped for the group of firms experiencing the lowest increase in stock liquidity surrounding decimalization.

observe the effect of stock liquidity on CSR to be more pronounced for firms with a higher transient institutional ownership or short-term institutional ownership.

Following Bushee's (1998) classification of institutional investors, we categorize institutions as either transient or non-transient, where transient institutional investors typically hold highly diversified portfolios, exhibit high portfolio turnovers, and have a strong incentive to pursue short-term trading profits, while non-transient institutions generally have low portfolio turnovers, monitor firm management intensely, and rely on information beyond current earnings to assess managers' performance (e.g., Gaspar, Massa, and Matos, 2005; Fang, Tian, and Tice, 2014). Transient (Non-transient) institutional ownership (hereafter *TRAIO* and *NONTRAIO*) are defined as the ratio between the number of shares held by transient (dedicated) institutional investors and the total number of shares outstanding. Furthermore, following Yan and Zhang (2009), we sort institutional investors into three terciles based on their portfolio turnover over the past four quarters and classify those in the top tercile as short-term institutional investors and those in the bottom tercile as long-term institutional investors. For each stock, short-term (long-term) institutional ownership (hereafter *STIO* and *LTIO*) are defined as the ratio between the number of shares held by short-term (long-term) institutional investors and the total number of shares outstanding.

Table 5 Panel A presents the regression results. In column (1), we observe that the coefficient estimate of *LIQ*×*STIO* is significantly negative, suggesting the negative effect of liquidity is stronger for firms with higher short-term institutional ownership. In column (2), we also find that the negative liquidity–CSR relation is stronger in firms with higher transient institutional ownership as the coefficient estimate of *LIQ*×*TRAIO* is significantly negative. These findings suggest that, given the same level of increase in stock liquidity, CSR performances of

firms with more short-term-oriented institutions experience a larger decline. These provide support for the short-termism view that the pressure from short-term investors drives managers away from the long-term-oriented CSR activities.[12]

5.1.2. The degree of managerial myopia

To further substantiate the short-termism channel, we examine the effect of liquidity on firms, whose managers are more likely to be myopic. We expect the negative impact of liquidity on CSR to be stronger for firms with more myopic managers. When CEOs' wealth is more closely tied to and more sensitive to the firm performance, they tend to be more myopic because these CEOs are more pressured by short-term investors to deliver the short-term performance. We thus use the CEO wealth-performance-sensitivity measure (*WPS*) constructed by Edmans (2009) as a proxy for managerial myopia. Moreover, literature (e.g., Gibbons and Murphy, 1992; Jenter and Lewellen, 2011) has also documented that managers tend to be more short-term focused when approaching their retirement age. To capture this incentive, we create a binary variable *AGE63* that equals one if the CEO is 63 or older, and zero otherwise.[13] Finally, He and Tian (2013) find that analysts coverage may exacerbate managerial short-termism by pressuring these managers to meet the short-term earnings target, which impedes firms' investment in long-term innovative projects. Hence, we use analyst coverage as the third proxy for managerial myopia. We define analyst coverage as the natural logarithm of the number of analysts who have issued at least one earnings forecast for the firm (*Analyst*). Higher values of *CEO_WPS*, *CEO_AGE63*, and *Analyst* indicate higher degrees of managerial myopia.

[12] In unreported tests, utilizing the propensity matched sample surrounding decimalization, we find the STIO and TRAIO increase more in treatment group than control group, leading to a statistically significant DiD estimator at the 5% level. The exogenous increase in stock liquidity due to decimalization increases holdings by short-term and transient institutional investors whose short-term focus and lack of monitoring may drive the liquidity-CSR relation.
[13] The official retirement age for executives for a lot of U.S. companies is 65. 63 is chosen as cut-off as there is only two years to step down as CEO and it is unlikely for them to focus on long-term targets.

We report the results in Panel B of Table 5. Consistent with our hypothesis, we find that the negative liquidity-CSR relation is stronger for firms whose managers are more prone to short-termism, i.e., managers with higher wealth-performance-sensitivity, managers with shorter distance to retirement, and firms with more analyst coverage. These results lend further support for the short-termism explanation of stock liquidity to our main findings.

5.2. The role of earnings pressure

The short-termism view of stock liquidity predicts that managers have stronger incentives to cut CSR investment if they are under actual earnings pressure. To test this argument, I divided the sample into two subgroups according to the performance pressure that managers face and examine whether our results are more driven by the situation when their performance pressure is higher. In doing so, we partition the sample into two subsamples based on absolute change of earnings per share (EPS): (1) the small change subsample (SC), where absolute change of EPS is below the sample median, and (2) the large change subsample (LC), where absolute change of EPS is above the sample median. Firms in the LC group have either a large decline or a large increase of EPS. To the extent that firms with large decline of EPS are more likely to miss the earnings target by a large amount, which is unlikely to be recovered by a cut in CSR investment, managers may not have a strong incentive to cut CSR investment. Meanwhile, firms with a large increase of EPS are well-performing firms; hence, managers of these firms do not have incentives to cut CSR investment either. In contrast, firms in the SC group are likely to be firms with higher earnings pressure because these firms either experience a small drop in EPS, which could possibly miss the earnings target or experience a small increase in EPS, which could possibly just to meet the target. In either situation, performance pressures are higher for managers in the SC group.

[Insert Table 5 about here]

To examine how managers' pressure to meet the short-term earnings target affects the negative effect of stock liquidity on CSR investment, we estimate Eq. (2) for both SC and LS subsample, separately. The regression results are shown in Panel C of Table 5. In line with the short-termism view, we find that the coefficient estimate of *LIQ* is negative and significant in the SC group in column (1) but insignificant in the LC group. The results indicate that the negative effect of stock liquidity on CSR only arises when managers' pressure to meet the short-term accounting performance is higher. These findings support the argument that higher liquidity strengthens managers' incentive to meet short-term performance goals, which in turn, discourages them to invest in CSR.

5.3. Alternative explanations

There may be other mechanisms through which stock liquidity affects CSR. For example, less liquid firms, which are less transparent and face more litigation risk in their investment projects, may choose to make more CSR investment as insurance against future litigation risks that are related to social and environment issues. To rule out this possibility, we conduct two subsample tests. First, we classify firms into subsamples with high and low litigation risk according to the industry they operate in. Specifically, we define a binary variable, *High Litigation Risk*, which equals one if a firm is in litigious industries (i.e., Chemicals, Industrial and Commercial Machinery, Electronic and other Electrical Equipment, Retail Trade), and zero otherwise. We add the *High Litigation Risk* and the interaction of *High Litigation Risk* and *LIQ* to Eq. (2). The results reported in column (1) of Table 6 show that the coefficient estimate of the interaction term is insignificant, indicating no significant difference between firms in high and low litigation industries.

[Insert Table 6 about here]

5.4. The effect of stock liquidity on CSR sub-indices

In the above-mentioned tests, we find that stock liquidity reduces firms' CSR performance. However, the reduction in CSR can take on many different forms. For example, companies may decide to invest less in the R&D of environment-friendly products, reduce work–life benefits (e.g., child care, flexible office time) for their employees, donate less to charity, etc. Thus, examining how stock liquidity affects different dimensions of CSR activities is a worthwhile endeavor.

[Insert Table 7 about here]

In this section, we extend our baseline specification in Eq. (1) to examine the effect of liquidity on the various dimensions of CSR investment. Specifically, we replace *CSR* in Eq. (1) with firms' CSR ratings in six dimensions such as products, diversity, human rights, employee relations, environment, and community, respectively, and re-estimate the regressions. We present the result in Table 7. We find that the negative impact of stock liquidity is significant on almost all dimensions, except diversity. These findings suggest that the adverse impact of stock liquidity on firms' CSR activities is extensive rather than concentrated in one particular aspect.

5.5. Real effects of stock liquidity: pollution prevention

We further examine the real effects of stock liquidity on CSR investment by looking at one specific aspect: pollution prevention. We obtain firms' investments in pollution prevention from the Toxic Release Inventory (TRI) program. Following Doshi, Dowell, and Toffel (2013), we only extrapolate the amount of waste reduced by pollution-prevention activities as firms do not

disclose such information.[14] We use two alternative measures of pollution prevention. *Prevention* is defined as the log-transformed amount of waste reduced by pollution prevention activities and scaled by total assets.

[Insert Table 8 about here]

The results in Table 8 show that stock liquidity is negatively related to pollution-prevention activities given that the coefficient on *LIQ* is significant and negative at the 5% level. This finding suggests that firms with high stock liquidity may cut investments in pollution prevention. By documenting a negative relation between stock liquidity and firms' pollution-prevention investment, we uncover one specific channel on the real effect of stock liquidity on firms' actual policy, which is consistent with both our baseline results and the sub-index regression results (Environment dimension).

6. Conclusion

CSR is an intangible asset for the firms, in which a long horizon is required to build and accrue gains over time. Using a large sample of U.S. firms from 1995 to 2013, we find that stock liquidity, an important stock market characteristic, negatively affects firms' CSR investment. We employ various tests to establish the causal link from stock liquidity to CSR by utilizing the decimalization of stock trading by three major stock exchanges in 2001, which generates a positive exogenous shock to liquidity. We then examine how our results vary according different firm and manager characteristics. In particular, we show that the negative liquidity effect on CSR is more pronounced in firms where managerial short-termism issue is more severe, i.e., firms

[14] For a given year, the amount of waste produced is predicted to multiply the production ratio by the total waste generated in the previous year, where the production ratio of a facility is the production level in the current year divided by the production level in the previous year. Then, we subtract the actual waste from the predicted waste to determine the amount of waste that is reduced by pollution-prevention activities.

with larger short-term institutional ownership, firms with CEOs whose wealth is more sensitive to performance, firms with CEOs approaching the retirement age, and firms with more analyst coverage. These findings further support our argument that liquidity discourages firms' investment in CSR activities by inducing managerial short-termism.

Our findings reveal the real effect of stock liquidity as an important stock market characteristic on firms' engagement in CSR activities, thus suggesting a new determinant of CSR. This paper also highlights one dark side of liquidity in that it impedes investments that can be beneficial for shareholders in the long run, and adds to the understanding of the real effects of stock liquidity on firms' policy.

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Table 1: Descriptive statistics

This table reports the descriptive statistics. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, the TAQ, and the KLD database between 1995 and 2013. Stock liquidity (*LIQ*) is defined as -100 times the relative effective spread, which is the ratio of the absolute difference between the trade price and the midpoint of the bid-ask quote over the trade price. Corporate social responsibility score (*CSR*) is defined as the sum of the strength scores of the six major dimensions in KLD based on approximately 80 strength indicators: product quality and safety, diversity, human rights, employee relations, environment, and community. Detailed variable definitions are in Appendix A. Panel A reports the summary statistics and Panel B presents the correlation matrix for the main variables, where numbers in bold indicate statistical significant at the 5% level.

Panel A: Summary statistics

Variable	N	Mean	SD	Q1	Median	Q3
CSR	21,783	1.232	2.030	0.000	0.000	2.000
LIQ	21,783	-0.196	0.340	-0.183	-0.093	-0.051
Size	21,783	6.877	1.761	5.696	6.787	7.995
Leverage	21,783	0.474	0.220	0.303	0.478	0.625
Cash/Asset	21,783	0.140	0.154	0.033	0.089	0.191
ROA	21,783	0.109	0.180	0.074	0.130	0.190
MB	21,783	3.512	4.771	1.387	2.213	3.724
Capex/Asset	21,783	0.251	0.222	0.078	0.180	0.359
Analyst	21,783	1.418	1.313	0.000	1.609	2.639
R&D/Asset	21,783	0.047	0.096	0.000	0.004	0.055

Panel B: Correlation matrix

	CSR	*LIQ*	*Size*	*Leverage*	*Cash*	*ROA*	*MB*	*Capex*	*Analyst*
LIQ	**0.125**								
Size	**0.486**	**0.470**							
Leverage	**0.141**	**0.091**	**0.411**						
Cash/Asset	**-0.104**	**-0.123**	**-0.415**	**-0.330**					
ROA	**0.117**	**0.258**	**0.346**	**0.072**	**-0.371**				
MB	**0.049**	**0.027**	**-0.100**	**0.219**	**0.224**	**-0.102**			
Capex/Asset	**0.063**	**0.059**	**0.227**	**0.229**	**-0.360**	**0.203**	**-0.090**		
Analyst	**0.235**	**0.246**	**0.287**	-0.013	**-0.019**	**0.105**	**0.056**	**0.024**	
R&D/Asset	**-0.039**	**-0.090**	**-0.337**	**-0.170**	**0.475**	**-0.578**	**0.290**	**-0.298**	**0.063**

Table 2: The effect of stock liquidity on CSR rating

This table reports the regression results for the relation between stock liquidity and corporate social responsibility score. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, TAQ, and the KLD database between 1995 and 2013. Firm fixed effect and year fixed effect are included in all regressions. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)
Dependent variable	CSR_{t+1}	CSR_{t+1}
LIQ	-0.161***	-0.258***
	(-2.5)	(-3.6)
Size		0.198***
		(3.5)
Leverage		0.140
		(1.1)
Cash/Asset		0.339***
		(2.7)
ROA		-0.084
		(-0.7)
MB		-0.007
		(-1.4)
Capex/Asset		0.192
		(0.6)
Analyst		0.099***
		(3.0)
R&D/Asset		0.180
		(0.6)
Observations	21,783	21,783
Adj R-squared	0.715	0.765
Firm FE	Yes	Yes
Year FE	Yes	Yes

Table 3: Robustness checks

This table presents the results of robustness tests. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, TAQ, and the KLD database between 1995 and 2013. Panel A and Panel B reports the results using alternative measures of corporate social responsibility and alternative measures of stock liquidity, respectively. Panel C reports the results using lagged liquidity measure at year t-1 and year t-2. All regressions include other control variables, firm fixed effect and year fixed effect. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

Panel A: Alternative measures of CSR

	(1)	(2)	(3)	(4)
Depedent variables	CSR_con_{t+1}	CSR_net_{t+1}	$CSR7_{t+1}$	CSR_adj_{t+1}
LIQ	-0.051	-0.206***	-0.363***	-0.032**
	(-1.3)	(-2.8)	(-4.5)	(-2.0)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	21,783	21,783	21,783	21,777
Adj R-squared	0.687	0.578	0.701	0.501

Panel B: Alternative measures of stock liquidity

	Dependent variable: CSR_{t+1}		
Liquidity variables	*Amihud ILLIQ*	*Zero*	*Quoted Spread*
Liquidity Measure	0.066*	5.650***	3.061**
	(1.7)	(5.3)	(2.0)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	20,630	21,429	21,779
Adj R-squared	0.726	0.718	0.716

Panel C: Long term effect of stock liquidity on CSR

	Dependent variable: CSR_{t+1}	
Liquidity variables	LIQ_{t-1}	LIQ_{t-2}
Liquidity Measure	-0.438***	-0.471***
	(-4.0)	(-4.0)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	17,637	14,470
Adj R-squared	0.724	0.746

Table 4: Using 2001 decimalization as a quasi-natural experiment

This table presents the results of changes in CSR around the 2001 decimalization. In Panel A, Δ denotes the change in each variable from the fiscal year before decimalization to the fiscal year after decimalization and change of *CSR* are regressed on the change in liquidity measures and change in control variables following Fang et al. (2009). Panel B presents the difference-in-differences (DiD) analysis using low price dummy from 1998 to 2004. *Post* is a dummy variable that equals one for the fiscal year after the decimalization. *LowPrc* is a dummy variable equals one if a firm's closing stock price in the fiscal year prior to the decimalization was below the sample median and zero otherwise. Panel B also presents the CSR dynamics when performing the DiD analysis using low price dummy. $Before^{-1}$ is a dummy variable equals to one for the fiscal year one year before decimalization and zero otherwise. *Current* is a dummy variable equals to one if the fiscal year is the decimalization year. $After^{1}$ ($After^{2\ \&3}$) are dummy variables that equal to one if the fiscal year is one year (two and three years) after the decimalization year and zero otherwise. In Panel C, we report the difference-in-differences regression results based on a matched sample. We follow Fang, Tian, and Tice (2014) to obtain a matched sample using propensity score matching. Firms are sorted into terciles based on their change in *LIQ* from pre-decimalization year to post-decimalization year. Firms in the top (bottom) tercile belong to treatment (control) group. For each firm in the treatment group, we use probit model to perform a one-to-one nearest neighbor propensity score matching. *Treat* is a dummy variable equal to one if a firm is in the treatment group and zero if in the control group. All control variables and industry fixed effect are included in the probit model. The results of probit regressions and diagnostic tests are reported in Appendix B. Control variables are included in all regressions. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

Panel A: Reverse causality

Dependent variable			ΔCSR	
Δ*LIQ*	-1.308*			
	(-1.8)			
Δ*Amihud ILLIQ*		0.077***		
		(8.0)		
Δ*Zero*			5.273**	
			(2.3)	
Δ*Quoted Spread*				4.614***
				(3.5)
Observations	249	249	249	248
Adjusted R-squared	0.021	0.015	0.029	0.016
Controls	Included	Included	Included	Included

Panel B: Interactions with low-priced stock with CSR dynamics

	(1)	(2)
Dependent variable	CSR_{t+1}	CSR_{t+1}
Post	0.497***	
	(3.5)	
LowPrc × *Post*	-0.332**	
	(-2.3)	
Before $^{-1}$		0.115
		(1.1)
Current		0.220*
		(1.7)
After ^{1}		0.476***
		(3.2)
After $^{2\ \&3}$		0.701***
		(4.3)
LowPrc × *Before* $^{-1}$		0.015
		(0.1)
LowPrc × *Current*		-0.124
		(-0.7)
LowPrc × *After* ^{1}		-0.416**
		(-2.3)
LowPrc × *After* $^{2\ \&3}$		-0.510**
		(-2.4)
Observations	1728	1,728
Adj R-squared	0.862	0.858
Controls	Included	Included
Firm FE	Yes	Yes
Year FE	Yes	NA

Panel C: Using a matched sample

	(1)	(2)
Dependent variable	CSR_{t+1}	CSR_{t+1}
Post	0.639***	
	(3.5)	
Treat × *Post*	-0.605***	
	(-2.7)	
Before^{-1}		0.091
		(0.7)
Current		0.286**
		(2.3)
After^{1}		0.590***
		(4.0)
After$^{2\&3}$		0.892***
		(6.4)
Treat × *Before*$^{-1}$		0.042
		(0.2)
Treat × *Current*		-0.154
		(-0.9)
Treat × *After*^{1}		-0.370**
		(-2.0)
Treat × *After*$^{2\&3}$		-0.792***
		(-4.5)
Observations	694	694
Adj R-squared	0.828	0.830
Controls	Included	Included
Firm FE	Yes	Yes
Year FE	Yes	NA

Table 5: Cross-sectional heterogeneity in results

This table presents the results on the possible channels of how stock liquidity affects firm's CSR. In Panel A, we report the results regarding the effect of institutional ownership on the liquidity-CSR relation. *TRAIO* and *NONTRAIO* are transient institutional ownership and dedicated institutional ownership based on the Bushee (1998, 2001) classification. *STIO* and *LTIO* denote the short-term institutional ownership and long-term institutional ownership respectively based on Yan and Zhang (2009). Panel B reports the results of interacting liquidity and managerial myopia proxies. *WPS* is the CEO wealth-performance-sensitivity measure. *AGE63* is a dummy variable equals to one if the CEO is 63 or older and zero otherwise. In Panel C, we split the sample based on absolute change of earnings per share (EPS). *Small Change* denotes firms with below median absolute change of EPS and *Large Change* denotes firms with above median absolute change of EPS. The control variables, firm fixed effect and year fixed effect are included in all the regressions. Standard errors are clustered by firm for all regressions and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

Panel A: The role of institutional investors

	(1)	(2)
Dependent variable	CSR_{t+1}	CSR_{t+1}
LIQ	-0.211*	-0.148**
	(-1.9)	(-2.3)
LIQ × STIO	-2.105***	
	(-3.6)	
STIO	-0.610***	
	(-3.3)	
LIQ × LTIO	0.564	
	(0.8)	
LTIO	-0.657***	
	(-2.8)	
LIQ × TRAIO		-0.504**
		(-2.0)
TRAIO		-0.300***
		(-3.2)
LIQ × NONTRAIO		0.169
		(0.8)
NONTRAIO		-0.321***
		(-3.3)
Observations	21,783	21,783
Adj R-squared	0.716	0.718
Firm FE	Yes	Yes
Year FE	Yes	Yes
Cluster	Firm	Firm

Panel B: Degree of managerial myopia

	(1) CSR_{t+1}	(2) CSR_{t+1}	(3) CSR_{t+1}
LIQ	-0.249***	-0.862***	-0.206***
	(-3.5)	(-2.6)	(-2.7)
LIQ × AGE63	-0.523*		
	(-1.7)		
AGE63	-0.081		
	(-1.2)		
LIQ × WPS		-0.001*	
		(-1.7)	
WPS		-0.000	
		(-0.8)	
LIQ × Analyst			-0.178*
			(-1.7)
Analyst			0.078**
			(2.1)
Observations	21,783	21,783	21,783
Adj R-squared	0.718	0.716	0.718
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Panel C: Earnings pressure and the effect of stock liquidity on CSR

	(1) CSR_{t+1}	(2) CSR_{t+1}
Absolute change of EPS	*Small Change (SC)*	*Large Change (LC)*
LIQ	-0.860***	-0.195
	(-2.8)	(-1.1)
Size	0.316***	0.160*
	(2.6)	(1.7)
Leverage	0.116	0.419*
	(0.4)	(1.8)
Cash/Asset	0.339	0.458*
	(1.2)	(1.9)
ROA	0.343	-0.138
	(0.9)	(-0.6)
MB	-0.021**	0.002
	(-2.0)	(0.2)
Capex/Asset	0.533	0.497
	(0.8)	(1.0)
Analyst	0.169**	0.112*
	(2.4)	(1.8)
R&D/Asset	0.121	0.029
	(0.2)	(0.1)
Observations	8,407	8,130
Adj R-squared	0.720	0.733
Firm FE	Yes	Yes
Year FE	Yes	Yes

Table 6: Alternative explanations

This table reports the regression results based on three subsamples partitioned on litigation risk measure, information asymmetry measure, and entrenchment index, respectively. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, TAQ, and the KLD database between 1995 and 2013. *High Litigation Risk* is the group of firms which are in litigious industries such as Chemicals, Industrial and Commercial Machinery, Electronic and other Electrical Equipment, Retail Trade while *Low Litigation Risk* indicates firms otherwise. Firm fixed effect and year fixed effects are included in all regressions. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

	(1)
Dependent variable	CSR_{t+1}
LIQ	-0.324***
	(-3.2)
LIQ × *High Litigation Risk*	0.181
	(1.3)
High Litigation Risk	-0.264
	(-1.2)
Observations	21,783
Adj R-squared	0.716
Controls	Included
Firm FE	Yes
Year FE	Yes

Table 7: Effect of stock liquidity on CSR sub-indices

This table presents the regression results using the strength score for each of the six dimensions in KLD as the dependent variable. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, TAQ, and the KLD database between 1995 and 2013. Firm fixed effect and year fixed effect are included in all the regressions. Standard errors are clustered by firm for all regressions and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Product	Diversity	Human rights	Employee relations	Environment	Community
LIQ	-0.025**	0.003	-0.014***	-0.049***	-0.044***	-0.044**
	(-2.0)	(0.1)	(-3.3)	(-2.7)	(-2.6)	(-2.1)
Size	0.018	0.055**	0.015**	0.064***	0.005	0.012
	(1.5)	(2.3)	(2.2)	(3.5)	(0.3)	(0.5)
Leverage	-0.006	0.079	-0.048***	-0.036	0.086**	0.044
	(-0.2)	(1.3)	(-2.9)	(-0.9)	(2.3)	(0.9)
Cash/Asset	0.007	0.215***	0.005	0.022	0.001	0.041
	(0.3)	(3.4)	(0.6)	(0.5)	(0.0)	(1.0)
ROA	-0.004	0.066	-0.015	0.003	-0.071**	-0.061
	(-0.2)	(1.0)	(-1.5)	(0.1)	(-2.1)	(-1.1)
MB	0.001	-0.004*	0.000	-0.001	-0.002*	-0.004*
	(0.8)	(-1.7)	(0.1)	(-0.7)	(-1.8)	(-1.8)
Capex/Asset	-0.071	0.124	0.063*	0.205*	-0.125	0.157
	(-1.2)	(1.0)	(1.7)	(1.9)	(-1.6)	(1.3)
Analyst	-0.001	0.046***	-0.000	0.026**	0.022**	0.026
	(-0.2)	(2.6)	(-0.0)	(2.5)	(2.4)	(1.6)
R&D/Asset	-0.011	0.156	0.020	0.078	-0.028	0.022
	(-0.2)	(1.1)	(1.0)	(0.8)	(-0.4)	(0.2)
Observations	19,972	21,617	19,793	21,722	21,743	16,824
Adj R-squared	0.499	0.643	0.225	0.587	0.454	0.630
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: Stock Liquidity and Corporate Social Responsibility: Pollution Prevention
This table presents the results of the effects of liquidity on firm's pollution prevention activity. *Prevention* is the log-transformed amount of waste reduced by pollution prevention activities and scaled by total assets. Industry fixed effect and year fixed effect are included in the regression. Standard errors are clustered by firm for all regressions and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

	(1)
	$Prevention_{t+1}$
LIQ	-1.086**
	(-2.4)
Size	0.022
	(0.3)
Leverage	0.789
	(1.4)
Cash/Asset	0.112
	(0.1)
ROA	0.154
	(0.2)
MB	-0.041*
	(-1.7)
Capex/Asset	4.297***
	(5.0)
Analyst	0.008
	(0.1)
R&D/Asset	-4.849*
	(-1.9)
Observations	5,188
Adjusted R-squared	0.270
Industry FE	Yes
Year FE	Yes

Appendix A

Table A1: Variable definitions

Variable	Definition
CSR	The total score of the strength rating of six dimensions in KLD database, including community, diversity, employee relations, environment, human rights, and product quality.
CSR_con	The total score of the concern rating of six dimensions in KLD database, including community, diversity, employee relations, environment, human rights, and product quality.
CSR_net	Net KLD index by subtracting the concerns from the strengths.
*CSR*7	The CSR scores plus the strength score of corporate governance.
CSR_adj	Adjusted CSR scores following Deng, Kang, and Low (2013).
LIQ	Annual relative effective spread multiplied by -100 so that higher values of LIQ implies higher stock liquidity. The relative effective spread is the ratio of the absolute value of the difference between the trade price and the midpoint of the bid-ask quote over the trade price. The annual relative effective spread is computed as the arithmetic mean of the daily relative effective spread.
Amihud ILLIQ	Amihud (2002) price impact measure, which captures the stock price changes per $ millions of trading volume.
Zero	The percentage of trading days with zero returns in the fiscal year, following Lesmond (2005).
Quoted spread	The average value of daily quoted bid-ask spread in the fiscal year, multiplied by negative one. Daily quoted bid-ask spread is the difference between daily ask price and daily bid price scalded by the midpoint of bid and ask price with data from CRSP.
Size	Natural logarithm of total assets
Leverage	Ratio of total liability over total asset
Cash/Asset	Cash over asset ratio
ROA	Return on assets
MB	Ratio of the market value of equity over the book value of equity
Capex/Asset	Capital expenditure scaled by total asset.
Analyst	Analyst coverage is calculated as the natural logarithm of (1+ number of analysts following), where the number of analyst following is defined as the number of analysts who have issued at least one earnings forecast for the firm in the fiscal year.
R&D/Asset	Research and development expenses scaled by total asset
LTIO	The percentage of shares held by long-term institutional investor, which is defined following Yan and Zhang (2009) based on portfolio turnover over the past four quarters.
STIO	The percentage of shares held by short-term institutional investor, which is defined following Yan and Zhang (2009) based on portfolio turnover over the past four quarters.
TRAIO	The percentage of shares held by transient institutional investor and quasi-indexers institutional investor defined using Bushee's (1998) classification.

NONTRAIO	The percentage of shares held by dedicated institutional investor defined using Bushee's (1998) classification.
WPS	The CEO wealth-performance-sensitivity measure by Edmans (2009). It is the dollar change in CEO wealth for a 100-percentage point change in firm value, divided by annual flow compensation.
AGE63	A dummy variable that equals to one if the CEO's age is equal or older than 63, and zero otherwise.
High Litigation Risk	A dummy variable equals to one if the firm is in litigious industry whose industry code falls within 2833 to 2836, 3570 to 3577, 3600 to 3674, 5200 to 5961, and 7370.
Prevention	Log-transformed amount of waste reduced by pollution prevention activities and scaled by total assets

Table A2: Annual distribution of sample firms

This table presents the sample distribution by year. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, TAQ, and the KLD database between 1995 and 2013.

Year	N	Percentage
1995	288	1.32
1996	289	1.33
1997	289	1.33
1998	297	1.36
1999	274	1.26
2000	277	1.27
2001	470	2.16
2002	533	2.45
2003	1,366	6.27
2004	1,360	6.24
2005	1,924	8.83
2006	1,924	8.83
2007	1,915	8.79
2008	1,899	8.72
2009	1,825	8.38
2010	1,931	8.86
2011	1,875	8.61
2012	1,894	8.69
2013	1,153	5.29
Total	21,783	100.00

Appendix B: Propensity score matching regressions and diagnostics for 2001 decimalization

This table presents the propensity score matching regressions results for DiD analysis of stock liquidity on CSR surrounding the decimalization year. Panel A, column 1 reports the results of a probit model based on the pre-matched firms in the treatment and control groups. The dependent variable equals to one if the firm belongs to the treatment group and zero otherwise. The explanatory variables are the same control variables used in the baseline regressions measured in the pre-decimalization year, together with industry fixed effect. Column 2 presents the results of the same probit model based on the post-matched firms. Panel B shows the average variable values in the pre-decimalization year for treatment and control groups, the differences in means of each variable and corresponding *p*-value. Standard errors are clustered by firm. *t*-statistics are shown in parentheses. ***, **, and * indicate statistical significant at the 1%, 5%, and 10% level, respectively.

Panel A: Probit regressions with pre- and post-matched sample

	Pre-match (1)	Post-match (2)
LIQ	0.667	-0.106
	(1.5)	(-0.2)
Size	-0.557***	-0.227
	(-4.7)	(-1.5)
Leverage	2.030**	0.639
	(2.3)	(0.6)
Cash/Assets	-3.632**	-0.837
	(-2.0)	(-0.4)
ROA	1.427	0.739
	(0.8)	(0.3)
MB	-0.166**	-0.070
	(-2.2)	(-0.8)
Capex/Assets	0.776	0.130
	(1.0)	(0.2)
Analyst	0.063	0.084
	(0.6)	(0.8)
R&D/Assets	-3.353	-2.457
	(-0.9)	(-0.6)
Industry fixed effects	Yes	Yes
Observations	171	106
Pseudo R-squared	0.330	0.064

Panel B: Differences in variables in pre-decimalization year

	Treatment group	Control group	Difference	*p*-value
LIQ	-0.337	-0.212	-0.125	0.113
Size	7.677	8.216	-0.538	0.162
Leverage	0.516	0.519	-0.003	0.935
Cash/Assets	0.064	0.074	-0.010	0.508
ROA	0.159	0.160	-0.001	0.963
MB	2.799	3.046	-0.247	0.591
Capex/Assets	0.278	0.284	-0.006	0.869
Analyst	1.879	2.013	-0.134	0.613
R&D/Assets	0.025	0.033	-0.008	0.341