Stock Liquidity and Corporate Social Responsibility

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This version: April 2019

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 CSR effect of liquidity is more pronounced for firms where short-term institutional ownership is higher, CEOs' wealth is more sensitive to firm value, CEOs approach the retirement age, analyst coverage is higher, or there are more covenants on firms' bank debt. These findings suggest that high stock liquidity increases short-termism pressure and discourages firms from engaging in CSR activities, which are long-term in nature. Overall, our analysis reveals the potential disincentives created by stock liquidity in aligning the interest of shareholders and other stakeholders.

JEL Classification: G12, G14, G32, M14
Keywords: Stock Liquidity, Corporate Social Responsibility (CSR), Investor Horizon, Short-termism

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"*CSR by definition is a long game - we need to give management incentives and breathing room to focus on the long term, yet we are tied to a culture that focuses on quarterly results and projections.*"

Paula Luff (*2016*)*, CEO of Viso Strategies Corporation*

1. Introduction

Corporate social responsibility (CSR hereafter) has become a mainstream business activity and a crucial management issue over the past years (e.g. *The Economist* 2008). An extensive global survey found that two-thirds of people reported that they would like firms to contribute to social goals beyond shareholder wealth (Environics International 1999). As an important corporate strategy to sustain the competitiveness and long-term success, engaging in CSR activities greatly contributes to firms' superior performance by boosting employee morale, attracting talented employees and "green" consumers in local communities, making more efficient use of resources, and obtaining more favorable credit ratings and easier access to finance.[1]

Unlike conventional corporate investment, investments in CSR inherently require a long-term perspective because CSR, as an intangible corporate asset that aligns the long-term interest of other key stakeholders including employees, customers, suppliers, and local communities with that of shareholders, increases firm value over the long-term.[2] In particular, Choi and Kim (2016) point out that the accrual of gains through CSR can be spread over years 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. Anecdotes are 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*

[1] See, among others, Flammer (2015), Hart (1995), Jones (1995), Porter and Kramer (2006 and 2011), Deng, Kang, and Low (2013), Jiraporn et al. (2014), and Cheng, Ioannou, and Serafeim (2014).
[2] See Russo and Fouts (1997), Freeman, Wicks, and Parmar (2004), Fatemi, Fooladi, and Tehranian (2015), Starks, Venkat, and Zhu (2017).

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, more than 70% of executives believe that CSR contributes to shareholder value in the long run.[3]

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' horizon incentives and in turn their decisions to engage in CSR. In particular, we develop two competing hypotheses on the CSR effect of stock liquidity based on literature discussing the role of stock liquidity in affecting managers' horizon incentives.

Our first hypothesis postulates that a higher level of stock liquidity enhances firms' CSR activities. Previous studies show that liquidity facilitates the formation of blocks (Kyle and Vila, 1991; Kahn and Winton, 1998; Maug 1998), accelerates impounding value enhancement from the intervention into stock price (Faure-Grimaud and Gromb, 2004), and reinforces blockholders' exit threat of selling shares (Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2011; Edmans, Fang, and Zur, 2013), which greatly accelerates the formation of blockholders and enhances the governance influence of blockholders, such as long-term institutional investors and socially responsible funds, on managerial incentives. Previous literature (Erhemjamts and Huang, 2016; Nguyen, Kecskes, and Mansi, 2017) shows that long-term institutional investors, which focus on the alignment of managers' interests with firms' long-run success, encourage CSR activities, because firms' long-term prospects depend on the well-being of the stakeholders and the durability of the relationships with them (Mitton, 2013). Moreover, emerging as a popular investment strategy in the asset management industry in the U.S., socially responsible

[3] Valuing corporate social responsibility: McKinsey Global Survey Results (2009). The report is retrieved from https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/valuing-corporate-social-responsibility-mckinsey-global-survey-results.

investing (SRI) has remarkably expanded in recent years.[4] Studies (e.g., Gillan and Starks, 2000; David, Bloom, and Hillman, 2007; Dyck et al., 2018) show that socially responsible funds as an important blockholder significantly influence managers' CSR commitments through shareholder activism. To the extent that stock liquidity may facilitate block holding by long-term institutional investors and socially responsible funds and strengthen the governance role of these funds in enhancing managerial incentives to pursue CSR, we expect that firms with more liquid stocks become more long-term oriented and engage more in CSR activities. We label this view the *governance* channel.

By contrast, our second hypothesis argues that a higher level of stock liquidity impedes CSR activities. Stock liquidity can exacerbate managerial short-termism (Coffee, 1991; Bhide, 1993). Intuitively, high liquidity facilitates the exit of short-term investors such as liquidity traders by allowing these investors to dump their stake at low costs. In other words, investors in a liquid firm are incentivized to exit upon the slightest of bad news in the short run rather than stay in the firm and actively monitor the firm to maximize its long-term value. Therefore, under the pressure of these short-term investors to deliver short-term performance, managers in liquid firms are motivated to take actions to inflate or maintain the stock price in the short run (Stein, 1988, 1989). Furthermore, similar to R&D, advertising, and the like, CSR reduces firms' near-term profits by incurring substantial up-front cash outlays on the well-being of other stakeholders and the sustainability of the environment but does not generate immediate gains for shareholders (Wood and Jones, 1995; Orlitzky, Schmidt, and Rynes, 2003), which creates the short-term conflicts of interest between shareholders and other stakeholders. As such, we expect that stock liquidity, which lowers the exit costs of investors chasing short-term profits, aggravates

[4] According to the U.S. SIF Foundation, the aggregate amount of SRI at the end of 2015 in the U.S. exceeds $8.72 trillion, which constitutes more than 20% of the total assets under management.

managerial short-termism and discourages managers to engage in CSR activities even if these activities can be beneficial for all stakeholders including shareholders of a firm in the long run (Fang, Tian, and Tice, 2014; Chang, Chen, and Zolotoy, 2017). We label this view as the *shorter-termism* argument.

Using a sample of 23,827 firm-year observations with CSR ratings from 1994 to 2013,[5] we empirically investigate the effect of stock liquidity on firms' CSR activities. Similar to previous studies (e.g. Flammer, 2015), our main measure of CSR activities is firms' CSR strength ratings in terms of product quality, diversity, human rights, employee relations, environment, and community, collected from the Kinder, Lydenberg, and Domini Research & Analytics (KLD) database. Following prior studies (e.g., Fang, Tian, and Tice, 2014; Chang, Chen, and Zolotoy, 2016), we measure stock liquidity primarily using the relative effective spread.

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 33.5% relative to the mean value. We conduct various checks to ensure that our main findings are robust to alternative liquidity measures, individual dimensions of CSR rating, and various model specifications. These findings are consistent with the short-termism view of stock liquidity but do not support the governance role of stock liquidity in terms of firms' CSR.

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 variable bias), or that the causal relation between stock liquidity and CSR activities is

[5] We end the sample in 2013 because of the data availability on our high frequency liquidity measure.

bidirectional (the reverse causality bias). To address these concerns, we employ a multipronged approach. Our first strategy aims to alleviate the omitted variable bias by controlling for an additional set of variables that may be potentially correlated with both stock liquidity and firms' CSR activities. The main results still hold. Our second strategy is to mitigate the reverse causality concern. In addition to using long-lagged liquidity measures as the explanatory variable in the regressions, we also employ a panel vector autoregressive (pVAR) approach. Our results do not alter.

In the third approach, we mitigate any remaining endogeneity concerns by conducting four tests using the decimalization of stock trading on the NYSE, AMEX, and NASDAQ in 2001, which significantly improves stock liquidity, as a natural experiment.[6] In the first test, we follow Fang, Tian, and Tice (2014) 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. The results show that firms' CSR performance experiences a significant deterioration after the exogenous improvement in stock liquidity caused by the decimalization event. In the second test, we construct a matched sample consisting of firms sharing similar characteristics prior to the decimalization but experiencing different levels of liquidity improvement in the decimalization. We then compare the change in CSR ratings for firms experiencing a larger liquidity improvement surrounding the decimalization (the treatment firms) with that for firms experiencing a smaller liquidity improvement (the control firms). Our results show a significantly larger decrease in CSR ratings for treatment firms than that for control firms.

[6] In 2001, the NYSE, AMEX, and NASDAQ started to implement an increment in quoting and trading stocks from one-sixteenth to decimals, which comes as a positive shock to stock liquidity (Fang, Noe, and Tice, 2009). Literature has shown that the decimalization of stock trading generally improves the stock liquidity of all firms listed on the three exchanges (Chordia, Roll, and Subrahmanyam, 2008).

The third test examines the dynamics of firms' CSR rating differentials around the decimalization between treatment firms and control firms as defined in the first test. We find that the differentials appear only after the decimalization. The last test is motivated by the findings of Edmans, Fang, and Zur (2013) that the decimalization has a disproportionately stronger impact on low-priced stocks since moving from one-sixteenth to decimals constitutes a greater proportional change for low-priced stocks relative to high-priced stocks. Comparing the change in CSR ratings between low-priced firms and high-priced firms, we find a disproportionately stronger effect of the decimalization on CSR ratings of low-priced than those for high-priced stocks. Collectively, our tests of endogeneity point to a causal effect 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 of our results to better understand the channel through which stock liquidity affects firms' CSR performance, and design a test similar to Bushee (1998) to directly examine how liquidity affects CSR when managers face the pressure to meet short-term earnings target. We first examine how the negative effect of liquidity on CSR varies depending on institutional ownership with different preferences for time horizon given that institutional investors are the dominant players in the stock market. In our short-termism argument, liquidity discourages firms' CSR investment through investors' exit pressure on managers to focus on near-term performance. Given institutional investors' large stake in a firm, the exit pressure from these investors is expected to be greater than that from other investors. Moreover, as the incentives to chase short-term performance are the stronger for institutional investors with a short-term horizon, we expect a stronger negative liquidity-CSR relation for firms with higher short-term institutional ownership.

Second, prior studies document factors such as CEO characteristics and external pressures may also induce managerial short-termism. For example, managers are more prone to myopia when managers face greater threat from takeover (Stein, 1988; Shleifer and Summers, 1988), when their wealth is more sensitive to firm performance (Bolton, Scheinkman, and Xiong, 2006; Cook and Zhang, 2017), 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), when their firms have more debt covenants (Spyridopoulos, 2018). 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 where CEOs' wealth is more sensitive to stock performance, where CEOs approach the retirement age, where analyst coverage is higher, where there are more covenants on firms' bank debt, and where takeover exposure is higher. To test these implications, we interact stock liquidity with managerial myopia indicators that capture abovementioned incentives. Consistent with our conjecture, we find that the adverse effect of liquidity on CSR is indeed more pronounced when managers are subject to more short-term pressure.

Third, we examine how firms' CSR performance is affected by liquidity when managers have different incentives to avoid missing the short-term earnings target. We find that the negative liquidity-CSR relation is more evident when the likelihood of managers meeting the short-term earnings target by cutting CSR investment is higher. Taken together, above 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 underinvest in CSR.

Finally, we verify that our results are robust to alternative CSR measures and explore the real effect of stock liquidity on firms' environmental and social performance. Specifically, we find that our main results are not affected if we measure CSR in different ways or measure firms' social performance using alternative data sources such as Thomson Reuter's ESG database and Sustainalytics.[7] In addition, using various sources such as the Toxic Release Inventory (TRI) program under the U.S. Environmental Protection Agency, Thomson Reuter's ESG database, the Invest Responsibility Research Center (IRRC) Dilution database, the Compustat Pension database, and Glassdoor.com, we find that liquid firms are more likely to underperform in pollution prevention, employee treatment, and corporate philanthropy. These results further complement our main findings by providing direct evidence on the adverse effect liquidity on firms' CSR performance.

Our study contributes to the existing literature in at least two important ways. First, our paper adds to the literature on the determinants of CSR. Prior literature identifies 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). Several studies look into those factors particularly related to the horizon problems of CSR investment. For example, recent research, e.g., Flammer and Bansal (2017), Oh, Chang, and Cheng (2016), and Nguyen, Kecskes, and Mansi (2016), has shown that long-term incentives such as long-term executive compensation, the longer career horizon, and the presence of long-term institutional investors induce firms to invest in CSR. We extend and complement this line of literature by identifying stock liquidity as an important stock market characteristic in

[7] For instance, the results are robust to defining CSR performance using net CSR scores defined as CSR strengths minus CSR concerns, CSR scores including the corporate governance dimension, and adjusted CSR scores computed as the difference between total CSR strength scores and total CSR concern scores, scaled by the sum of CSR strengths and concerns, respectively.

discouraging firms' CSR investment through exacerbating managerial myopia. This finding suggests an important perspective for policymakers who are interested in cultivating CSR in Corporate America.

Second, our study also 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 investors, in particular investors pursuing short-term targets, to sell their stakes of firms in trouble without making efforts in monitoring and intervention (Coffee, 1991; Bhide, 1993). We show that stock liquidity can pressure managers to focus on near-term performance, thereby deteriorating firms' CSR performance. Hence, our findings complement Fang, Tian, and Tice (2014) in uncovering an unintended consequence of stock liquidity in hindering firms' investment that can be beneficial for shareholders in the long run and intensifying the conflicts of shareholders and other stakeholders.

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.

Thus far, 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' intervention 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 can exacerbate managers' short-termism because traders chasing short-term performance can easily exit upon the slightest of bad news. 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 because it induces managers to inflate short-term earnings by withholding bad news.

There is a third view, which argues that the exit threat by blockholders also improves firms' governance because managers' equity-based compensation can be adversely affected ex-post by

investors' selling (Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2011). A few studies (e.g., Edmans, Fang, and Zur, 2013; Chen et al., 2015) find 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 performance.

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. Liang and Renneboog (2017) show the importance of country-level legal origin in explaining the cross-country difference in CSR strategies. 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.

In addition, several studies focus on those factors related to the horizon problems of CSR investment. For example, Flammar and Bansal (2017) show that firms are more likely to engage in CSR activities after companies pass long-term executive compensation proposals at shareholder meetings. Erhemjamts and Huang (2016) and Nguyen, Kecskes, and Mansi (2016) find that long-term institutional investors promote CSR as firms with long-term institutional ownership regard CSR as an important strategy to boost long-run firm value. In addition, Oh, Chang, and Cheng (2016) relate CEO characteristics to CSR performance. In particular, they find that old CEOs tend to disengage in CSR due to shorter career horizons.

Despite these studies, to the best of our knowledge, no research has yet to investigate the interaction between stock market and CSR. 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, in particular those related to the horizon issues of CSR, and highlights the real effect of stock market characteristics.

3. Data, sample, and variables

3.1. Data and sample

We extract CSR data from the 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 the Center for Research in Security Prices (CRSP), firm financial data from Compustat, analyst coverage data from the 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, and managerial compensation data from the ExecuComp database.[8]

Our sample includes firm-year observations jointly covered by KLD, Compustat, CRSP, and TAQ. Our sample starts from 1994 and ends in 2013 because stock liquidity data, which rely on high frequency realized transaction data, are available from 1993 to 2013. As we lag the independent variable by one year, our sample begins at 1994. We exclude firm-years with missing values for variables in the main regression. Our final sample consists of 23,827 firm-year observations from 1994 to 2013. Table A1 in Appendix shows the sample distribution by year. The number of sample firms is steady around 460 from 1994 to 2000 before increasing to

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

704 in 2001 and 707 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.[9] The number of firms in each year after 2003 becomes fairly stable at around 1,600 to 1,800.

3.2. Variables

We follow prior CSR literature (e.g., Flammer, 2015; Flammer and Bansal, 2017; Flammer and Luo, 2017; Flammer, 2018) 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 activities. KLD rates firms along six dimensions, namely product quality and safety, diversity, human rights, employee relations, environment, and community.[10] 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.

Our main measure of liquidity is the relative effective spread calculated using the intraday TAQ data. The effective spread 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.

[9] Our results are robust to both subsamples split by 2002.

[10] 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.

In particular, 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 on the 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 four alternative measures of stock liquidity: Amihud's (2002) price impact measure (*Amihud*), stock turnover (*Turnover*), Lesmond's (2005) percentage of zero daily returns measure (*Zero*), and quoted bid-ask spread (*QuotedSpread*). We discuss these alternative stock liquidity measures in greater details in Section 4.2.

To isolate the effect of stock liquidity on firms' CSR performance, we control for a battery of firm characteristics that may 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 in Liang and Renneboog (2017), we include return on assets (*ROA*) as a proxy for firms' operating performance, calculated as earnings before interest and taxes (EBIT) divided by the book value of assets. We also control for firms' growth opportunity by including the market-to-book ratio (*MB*) calculated as the ratio of market value of equity over book value of equity. The leverage ratio (*Leverage*) and the cash-to-assets ratio

(*Cash/Asset*) are included to account for the effects of capital structure and cash holdings on CSR investment. Moreover, we control for firms' investment activities such as capital investment (*Capex/Asset*) defined as capital expenditures over total assets, and R&D investment (*R&D/Assets*) defined as R&D expenses scaled by total assets, which captures the observable quantitative input to the innovation process, which is another long-term investment (e.g., Aghion, Van Reenen, and Zingales, 2013).[11] We also include analyst coverage (*Analyst*) computed as the natural logarithm of one plus the number of analyst following the firm during the fiscal year in the regression to account for firms' information environment.[12] Finally, we control for the annual stock return (*Ret*) calculated as the annual stock return compounded from the monthly stock returns within the fiscal year.

3.3. Descriptive statistics

We report the summary statistics of the main variables in Panel A of Table 1. CSR score (*CSR*) of our sample firms has a mean value of 1.491, with a standard deviation of 2.368. The mean and the standard deviation of our main liquidity measure (*LIQ*) – are 0.143 and 0.169, respectively. Comparing summary statistics of our sample firms with those of the universe of Compustat/CRSP firms (mean value of *LIQ* is -0.643) in the same sample period, we find that our sample firms, on average, have higher stock liquidity. This is not surprising in that the firms covered by KLD are typically large firms (e.g. S&P 500 firms, Russell 3000 firms), which usually have higher stock liquidity than small firms. This finding is also confirmed by our firm size (*Size*) measure: the average *Size* of our sample firms is 7.185, while that of Compustat/CRSP firms is only 5.228. Similarly, an average firm in our sample has higher

[11] Firm-years with missing R&D information are assigned a zero R&D value (Hirshleifer, Low, and Teoh, 2012).
[12] 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.

leverage ratio, lower market-to-book ratio than an average Compustat/CRSP firm. Table 1 Panel A also reports the summary statistics of the variables in the empirical models.

[Insert Table 1 about here]

In Panel B, we present the correlation matrix of variables in the main analysis. We find that *CSR* is positively correlated with *Size* and *ROA*, consistent with previous findings that larger and more profitable firms are likely to invest in CSR. However, the correlation between *CSR* and *LIQ* is positive, which is driven by the increasing time trends of both stock liquidity and firms' CSR investment over the time.[13] 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 examine the effect of stock liquidity on firms' CSR performance by estimating the baseline regression model in Eq. (1) as follows:

$$CSR_{i,t} = \beta_0 + \beta_1 LIQ_{i,t-1} + \gamma Control_{i,t-1} + \delta Industry_i + \theta Year_t + \varepsilon_{i,t}, \qquad (1)$$

where $CSR_{i,t}$ represents the CSR ratings for firm *i* in year *t*. The key independent variable, $LIQ_{i,t-1}$, is the annual relative effective spread times -100, measured in year *t*-1. β_1 captures the CSR effect of liquidity. *Control* refers to the set of control variables described in Section 3.2. All control variables in the regressions are measured in year *t*-1. We include industry fixed effects and year fixed effects to control for the effect of time-invariant industry characteristics, and the aggregate time variation in CSR activities, respectively. The *t*-statistics reported are based on

[13] The positive correlation would bias against us finding a negative relation between stock liquidity and CSR.

standard errors 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. The coefficient of *LIQ* is negative and significant at the 1% level, suggesting that more liquid firms are associated with a lower CSR rating. In terms of economic significance, a one-standard-deviation increase in stock liquidity (i.e., 0.169) is associated with a 0.5 decrease (0.169×(–2.958)) in the CSR score, which is approximately 33.5% of the sample mean of CSR score (1.491). To put this in perspective, a one-standard deviation increase in *Cash/Assets* (0.183), which has been shown by prior studies (e.g., Ferrell, Liang, and Renneboog, 2016) to be an important determinant of CSR performance, increases the CSR rating by 0.228 (= 1.245×0.183). Thus, the effect of stock liquidity on 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 firm leverage and past stock return. Untabulated tests show that the largest variance inflation factor (VIF) is below 5, suggesting that multicollinearity is not a 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 negative relation between stock liquidity and CSR is consistent with the short-termism view that stock liquidity exacerbates managerial myopia, which in turn, reduces companies' engagement in CSR activities. The results, however, do not support the governance role of liquidity in promoting CSR.

4.2. Robustness tests

We conduct further analyses to ensure our baseline results are robust to alternative liquidity measures, individual dimensions of CSR rating, and various model specifications. We report the results in Table 3. For brevity, we only tabulate the coefficients of stock liquidity.

We first examine whether our results are sensitive to different measures of stock liquidity. Specifically, we consider the following four alternative liquidity measures widely used in prior literature. The first alternative liquidity measure is constructed using Amihud (2002) illiquidity measure that is estimated as the daily price response associated with one dollar of trading volume. To facilitate the interpretation of results, we multiply the Amihud (2002) illiquidity measure by negative one (*Amihud*) so that a higher value of *Amihud* indicates higher stock liquidity.[14] Our second alternative liquidity measure is stock turnover (*Turnover*), defined as the average value of the daily stock turnover within the fiscal year where daily stock turnover is computed as trading volume divided by shares outstanding.

In addition, because illiquid stocks are more likely to experience trading days with zero returns due to either no trading interest or high trading cost (Lesmond et al., 1999), we employ the proportion of days with zero returns within the fiscal year (*Zero*) as the third alternative liquidity measure. We again multiply this measure by negative one so that a higher value of *Zero* represents higher liquidity. The last alternative liquidity measure is the average of the daily quoted bid-ask spread multiplied by negative one (*QuotedSpread*).[15] The daily quoted bid-ask spread, which measures the trading costs of a stock, is calculated by dividing the difference between bid and ask price by the midpoint of bid and ask price using CRSP daily file.

[14] The Amihud (2002) illiquidity measure is computed as the annual average of the daily ratio of absolute value of stock return divided by dollar trading volume, multiplied by one million. It captures the idea that, for a given amount of trading, illiquid stocks should experience a larger change in price.
[15] A higher value of *QuotedSpread* indicates higher liquidity.

We then replace *LIQ* in Eq. (1) with these alternative measures and re-estimate the regressions. We present the results in Panel A of Table 3. Consistent with our baseline findings, the coefficient estimates of all four alternative measures are negative and significant, suggesting that our main findings are robust to different measures of stock liquidity.

[Insert Table 3 about here]

Second, although our main findings show a negative association between stock liquidity and firms' CSR performance, it is still unclear which dimensions of CSR performance are affected. To answer this question, 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 Panel B of Table 3. We find that the negative impact of stock liquidity is significant on all six dimensions. These findings suggest that managers' disincentives induced by stock liquidity to engage in CSR activities are extensive rather than concentrated in one particular aspect.

Finally, we perform a number of additional tests to ensure that our baseline results are not sensitive to alternative model specifications. In particular, we find that none of the following has a major effect on our results: (*a*) estimating the baseline regression with firm fixed effects to control for the effect of time-invariant firm characteristics on CSR; (*b*) estimating the baseline regression using Fama and MacBeth's (1973) approach that corrects standard errors for cross-sectional correlations; (*c*) excluding firm-years with zero CSR ratings to alleviate the concern that the relation is driven by firms that do not invest in CSR and thus have zero ratings; (*d*) conducting sub-period analysis (i.e., firm-years before and after 2002) to address the concern that the coverage of sample firms by KLD has expanded substantially since 2003. Table 3 Panel C

presents the results. We find that the coefficient of stock liquidity are all negative and significant in various model specifications.

4.3. Endogeneity

While we have documented a robust negative relation between stock liquidity and firms' CSR performance, the results could be subject to endogeneity. The first type of endogeneity is the omitted variable bias. Although we have controlled for a standard set of variables in Eq. (1), which are documented by previous studies to affect CSR, the liquidity-CSR relation may be spurious if our model omits any variables affecting both liquidity and CSR investments at the same time. The other plausible endogeneity issue is reverse causality running from CSR to stock liquidity. To alleviate these endogeneity concerns, our first strategy is to control for several variables that may be potentially correlated with both stock liquidity and firms' CSR activities. Our second strategy is to mitigate the reverse causality concern. In addition to using long-lagged liquidity measures as the explanatory variable in the regressions, we also employ a panel vector autoregressive (pVAR) approach. In our third strategy, we design several tests utilizing a quasi-natural experiment to mitigate any remaining endogeneity concerns. We tabulate the results in Table 4.

Panel A reports the results addressing specific omitted variable problems. In column (1), we control for industry fixed effect and state-by-year fixed effect to mitigate the concern that certain cultural or geographical factors are driving the results. In column (2), we control for industry-by-year fixed effect to alleviate the concern that industry specific events in certain year may affect our results. In column (3), we explicitly control for several variables that may affect CSR as well. Specifically, *CSRConcern* is CSR concern score defined as the total sum of concern indicators from KLD database. *MediaCoverage* is the number of articles reported by media from

RavenPack, divided by 100. *Sentiment* is the average event sentiment score of all the articles reported by media from RavenPack. *CgovStr* is the strength score in corporate governance dimension extracted inform the KLD database.

An omitted variable problem may also arise if less liquid firms, which are more opaque and thus have high litigation risk, choose to make more CSR investment as insurance against future litigations involving social and environmental issues (Koh, Qian, and Wang, 2013). Thus, we further control for *Litigation*, which is a binary variable, which takes the value of one for firms in litigious industries as defined in Matsumoto (2002), such as Chemicals, Industrial and Commercial Machinery, Electronic and other Electrical Equipment, Retail Trade. In column (4), we include all abovementioned variables together with state-by-year fixed effect and industry-by-year fixed effect in the regression. In all four columns, we find that the coefficients of stock liquidity are negative and highly significant at the 1% level.

To mitigate reserve causality concern, we use long-lagged (i.e. at *t*-2 and *t*-3) value of stock liquidity as the independent variable, and report the results in Table 4 Panel B. Moreover, we employ the technique of panel vector autoregressive regression (pVAR) to explicitly test the reverse causality issue, and tabulate the results in Panel C.[16] The results show that the negative effect of liquidity on CSR is unaffected by using long-lagged liquidity measures or by an econometric framework that takes into account the forward and reverse causality between stock liquidity and CSR at the same time.

[16] The pVAR approach has been used by several recent studies (e.g., Grinsten and Michaely (2005), Love and Zicchino (2006), Goto, Watanabe, and Xu (2009)) to disentangle the causal effects and investigate intertemporal interactions between endogenous variables.

To further address the remaining endogeneity concerns, we employ the decimalization of stock trading in 2001 as a natural experiment.[17] 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 the liquidity of all stocks. Moreover, some studies (e.g., Edmans, Fang, and Zur, 2013) also find that the decimalization event has a disproportionately 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. Based on these findings, we believe that the decimalization event in 2001 can serve as a good quasi-natural experiment for us to further 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 can 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.

First, following Fang, Noe, and Tice (2009), we 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. This test can partially mitigate

[17] 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).

the reverse causality concern in that the change in liquidity is exogenous due to decimalization. The results presented in Panel D of Table 4 show that an increase in liquidity caused by the decimalization indeed results in a decrease in firms' CSR rating, confirming that firms CSR performance deteriorates in response to the positive liquidity shock.

Second, to alleviate the concern that firms' heterogeneity prior to the decimalization may be correlated with the magnitude of the increase in stock liquidity thus driving the results, we employ a DiD identification strategy and compare the change in firms' CSR ratings for two groups of firms that are similar but experience a significantly different change in liquidity surrounding the decimalization. The DiD setting controls for the impact of omitted and unobserved variables and removes biases driven by time trends. In doing so, we first construct a treatment group and a control group using propensity score matching following prior literature (e.g., Fang, Tian, and Tice, 2014; Brogaard, Li, and Xia, 2017). In particular, we first rank all firms based on the liquidity change of their stocks around the decimalization and sort the firms according to the liquidity change and assign them into terciles. Only firms in the top tercile (i.e. firms with highest increase in liquidity surrounding decimalization) and bottom tercile (i.e. firms with lowest increase in liquidity surrounding decimalization) are retained for further analysis.

We then estimate a probit model where we regress a binary variable that equals one for firms in the top tercile and zero for firms in the bottom tercile on *LIQ* and the same set of control variables, measured in 2000, the pre-decimalization year. For each firm in the top tercile, we use the predicted probability (i.e., the propensity score) to find a matching firm from the bottom tercile. Eventually, we obtain a matched sample with a treatment group and a matched control group, in which firms shared similar firm characteristics and liquidity prior to the decimalization but experience different changes in liquidity in response to the exogenous shock of the

decimalization.[18] We create a binary variable to distinguish firms in the treatment group and the control group (*Treat*), which takes the value of one if a firm is in the treatment group, and zero if a firm is in the control group.

Next, we compare the change in CSR ratings for the treatment group and the control group before and after the decimalization by replacing *LIQ* in Eq. (1) with *Treat*, *Post*, and the interaction of *Treat* and *Post* (*Treat*×*Post*) and re-estimating the regression with firm fixed effects instead of industry fixed effects to account for the effect of time-invariant characteristics. Following Fang, Tian and Tice (2014), we focus on a seven-year window surrounding the decimalization (year *t*) from year *t*-3 to year *t*+3 for the DiD analysis.[19] We report the regression results based on the matched sample in Panel E of Table 4. In column (1), the coefficient of the interaction term between *Treat* and *Post* is negative and statistically significant at the 1% level, suggesting that firms experiencing a larger increase in liquidity surrounding the decimalization reduce CSR investment more than those experiencing a smaller increase in liquidity.

To substantiate the forward causality from stock liquidity to firms' CSR investment using this setting, we follow Bertrand and Mullainathan (2003) and examine the dynamics of a firm's CSR performance around the decimalization. In particular, we modify Eq. (1) by including the year dummies and their interactions with *Treat* around the decimalization. Specifically, $Before^{-1}$ (*Current*) is a binary variable that equals one if it is one year prior to the decimalization year (the

[18] 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.

[19] A short window allows us to better control for the impact of unobserved variables because significant changes in those variables are less likely to happen during a short window.

decimalization year) and zero otherwise. *After*^{1} (*After*$^{2\&3}$) is a binary variable that take a value of one if it is one year (two and three years) after the decimalization.[20] We show the results of CSR dynamics in column (2) of Table 4 Panel E. The insignificance of the interaction terms *Treat*×*Before*$^{-1}$ and the *Treat*×*Current* again alleviates the reverse causality concern in that the liquidity effect only starts to appear after the liquidity shock.[21] The coefficients of *Treat*×*After*^{1} and *Treat*×*After*$^{2\&3}$ are both significantly negative, suggesting that treatment firms (i.e., firms with highest liquidity increase) experience a larger decline in CSR ratings than control firms after the decimalization.

[Insert Table 4 about here]

Last, to further explore the heterogeneous liquidity effects caused by the decimalization on high- versus low-priced stocks, we adopt an identification strategy suggested by Edmans et al. (2013) to examine the difference of firms' CSR rating change before and after this event between firms with high-priced and low-priced stocks. In particular, we create two binary variables to 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 and prior to it. *LowPrc* takes the value of one if a 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 regression.

The coefficient of *Post*×*LowPrc* thus captures the different impacts of the decimalization on high-priced versus low-priced stocks. We report the results in Panel F of Table 4. Consistent with our conjecture, the coefficient of *Post*×*LowPrc* is negative and significant at the 5% level,

[20] The omitted group (benchmark) consists of the observations made two or three years before decimalization.
[21] The results also suggest that the parallel trend assumption for the DiD approach is satisfied.

suggesting that the decline of CSR performance is more pronounced for the low-priced stocks than for high-priced stocks after the decimalization.

In addition, we repeat the analysis of CSR dynamics in this setting and present the results in column (2) of Table 4 Panel F. The results show statistically insignificant coefficients of *LowPrc*×*Before*$^{-1}$ and *LowPrc*×*Current*, suggesting that the difference of firms' CSR performance between firms with low-priced stocks and those with high-priced stocks does not show up prior to the decimalization. The coefficients of *LowPrc*×*After*^{1} and *LowPrc*×*After*$^{2\&3}$, however, 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.

To summarize, while endogeneity is a perennial issue that no empirical test can entirely rule out, we conduct a battery of tests to alleviate endogeneity concerns and find that our main conclusion holds. Although each test can be subject to criticism, the balance of evidence points to a causal effect of stock liquidity on CSR performance.

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. To have a better understanding of the channel through which stock liquidity affects firms' CSR performance, in this section, we explore how the negative effect of stock liquidity on firms' engagement in CSR activities varies according to various firm and manager characteristics. In

addition, we also design a test similar to Bushee (1998) to directly examine how liquidity affects CSR when managers face the pressure to meet short-term earnings target.

5.1.1. The presence of different types of institutional ownership

We argue that stock liquidity discourages firms' CSR investment through investors' exit pressure on managers to focus on near-term performance. Given institutional investors' large stake in a firm, the exit pressure from these investors is expected to be greater than that from other investors. Thus, we first investigate the role of institutional investors in the CSR effect of liquidity. Moreover, as the incentives to chase short-term performance are mainly from institutional investors with a short-term horizon, we expect that the presence of short-term institutional investors intensifies managerial short-termism, thus lending to a stronger negative liquidity effect on CSR.

To examine the conjecture, we first interact *LIQ* with institutional ownership (*IO*) and include the interaction term and *IO* in the regression. Next, we followYan and Zhang (2009) and decompose institutional ownership into ownership held by short-term investors and by long-term investors. Specifically, 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*) is calculated as the ratio of the number of shares held by short-term (long-term) institutional investors over the total number of shares outstanding. We then include the interaction terms of both *LIQ*×*STIO* and *LIQ*×*LTIO* in Eq. (1) together with *STIO* and *LTIO*.

Last, to ensure that our results do not simply reflect our classification of institutional investors' time-horizon, we also employ Bushee's (1998) classification of institutional investors,

and categorize institutions as transient investors, quasi-indexers, and dedicated investors. Transient 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 such as quasi-indexers and dedicated investors 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). We define transient, quasi-indexer, and dedicated institutional ownership (hereafter *TRAIO*, *QIXIO*, and *DEDIO*) as the ratio of the number of shares held by transient, quasi-indexer, and dedicated institutional investors over the total number of shares outstanding, respectively. We then re-estimate Eq. (1) by including the interaction terms of *LIQ*×*TRAIO*, *LIQ*×*QIXIO*, and *LIQ*×*DEDIO* together with *TRAIO*, *QIXIO*, and *DEDIO*.

Table 5 Panel A presents the regression results. In column (1), the coefficient of *LIQ*×*IO* is negative and significant at the 1% level, confirming that institutional ownership indeed strengthens the liquidity-CSR relation. In column (2), after decomposing institution ownership into short-term ownership and long-term ownership, we find that the coefficient of *LIQ*×*STIO* is negative and highly significant while the coefficient of *LIQ*×*LTIO* is positive and highly significant, suggesting that our findings in column (1) are driven by firms with higher short-term institutional ownership. In the same vein, the results in column (3) also show that the negative liquidity–CSR relation is stronger in firms with higher transient institutional ownership as the coefficient of *LIQ*×*TRAIO* is significantly negative, while the coefficient of *LIQ*×*QIXIO* is insignificant and the coefficient of *LIQ*×*DEDIO* is significantly positive. Consistent with the short-termism view of stock liquidity, the findings in this section suggest that, given the same

level of increase in stock liquidity, CSR performance deteriorates more in firms with the presence of short-term oriented institutional investors.

5.1.2. Other factors that induce managerial myopia

In this section, we further consider a number of managerial and firm characteristics that are documented by previous literature to affect managers' horizon incentives, and examine the effect of these characteristics on the liquidity-CSR relation. We expect the negative impact of liquidity on CSR to be stronger for firms where managers are more prone to be myopic.

Kyle and Vila (1991) argue that high liquidity increases a firm's exposure to takeovers. Previous study (e.g., Fang, Tian, and Tice, 2009) suggests that takeover exposure tend to make managers having less incentive to invest in activities with long-run payoffs and putting more effort in short-term projects. Hence, takeover exposure could be one explanation of the negative liquidity-CSR relation. We use two measures to proxy for the takeover exposure faced by the manager. First, we construct the industry acquisition intensity measure (*IndMAInt*), computed as the ratio between the number of attempted and completed takeovers in a firm's industry scaled by the total number of firms in that industry. It measures the likelihood of being acquired for the firm in a particular industry using historical takeover statistics. Second, we construct a firm's takeover exposure following Cremers, Nair, and John (2009) by estimating the firm-specific probability of being a target and construct a dummy variable *HighTakeoverProb* which equals 1 if the takeover probability is above the median values in a given year and 0 otherwise. The data on mergers and acquisitions (M&As) come from Thomson Reuters SDC database.[22] We then interact *LIQ* with the two variables and include both the interaction terms and the two variables, respectively, in Eq. (1). The results are shown in columns (1)-(2) in Panel B of Table 5. We find

[22] The results are similar if we use all attempted and completed deals or use only completed deals to measure the takeover exposure.

that the negative effect of liquidity on CSR is stronger for firms with greater industry takeover intensity as well as higher probability of being targeted. The evidence is consistent with our expectation and suggests that pressure from takeover market could make managers more short-term oriented.

Besides, previous literature (e.g., Bolton, Scheinkman, and Xiong, 2006) shows that managers tend to be myopic when CEOs' wealth is sensitive to the firm performance because given a limited tenure, these CEOs have strong incentives to boost their short-term wealth by engaging in short-term projects that can generate profits quickly at the costs of long-term projects that are beneficial for shareholders in the long run. We thus employ the CEO wealth-performance-sensitivity measure (*WPS*) constructed by Edmans (2009) as a proxy for this incentive.[23] Previous studies (e.g., Gibbons and Murphy, 1992; Jenter and Lewellen, 2011) also show 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.[24] Moreover, He and Tian (2013) document that analysts coverage may exacerbate managerial short-termism by pressuring these managers to meet external performance benchmarks such as analyst forecasts or stock recommendations, which impedes firms' investment in long-term innovative projects. Hence, we create a binary variable *HighAnalyst*, which takes the value of one if analyst coverage is above the sample median, and zero otherwise, as the third proxy for managerial myopia. Finally, literature (e.g., Dechow, Sloan, and Sweeney, 1995) shows that managers with stricter covenant requirements are likely to face greater pressure to deliver short-term performance in order to meet debt obligations. We thus construct a binary

[23] The WPS data are obtained from http://alexedmans.com/data/. In particular, *WPS* measures the dollar change in CEO wealth for a hundred-percentage point change in firm value, divided by annual flow compensation.
[24] The official retirement age for executives for a lot of U.S. companies is 65. However, we choose 63 as the cut-off because it is unlikely for CEOs who are going to step down in two years to focus on long-term targets.

variable, *HighCovInt*, to measure the intensity of a firm's loan covenants. In particular, *HighCovInt* equals one if the number of covenants are above the sample median, and zero otherwise. Higher values of *WPS, AGE63,* and *Analyst HighAnalyst, and HighCovInt* indicate higher degrees of managerial myopia.

[Insert Table 5 about here]

We then interact *LIQ* with the four variables and include the interaction terms together with the four variables, respectively, in Eq. (1). We report the regression results in columns (3)-(6), Panel B of Table 5. Consistent with our expectation, we find that the negative effect of liquidity on CSR is more pronounced for firms where CEOs' wealth is more sensitive to firm value, where CEOs approach the retirement age, where analyst coverage is higher, and where there are more covenants on firms' bank debt. Collectively, the results together those in Section 5.1.2 reassure the short-termism explanation of stock liquidity to our main findings.

5.2. The role of performance pressure

Prior literature (e.g., Bushee 1998; Chen et al., 2015) has shown that managers have stronger incentives to cut long-term investment if they are under pressure to deliver short-term performance. To the extent that liquidity exacerbates managers' incentives to pursue near-term performance, we expect the negative effect of liquidity on firms' CSR performance to be stronger when it is more likely for managers to avoid missing the short-term earnings target by cutting CSR investment. To test this conjecture, we examine how the performance pressure that managers face affects the liquidity-CSR relation.

In doing so, we partition the sample into two subsamples based on absolute percentage change of earnings per share (EPS): (1) the small change subsample (SC), where the absolute percentage change of EPS is below the sample median, and (2) the large change subsample (LC),

where the absolute percentage change of EPS is above the sample median. Firms in the SC group experience a smaller change in EPS than those in the LC group. Because firms with a large decline of EPS are more likely to miss the earnings target by a large amount, which is unlikely to be offset by a cut in CSR investment, managers have weaker incentives to do so. In addition, firms with a large increase of EPS are not inclined to cut CSR investment either since they have the weakest incentives to boost the EPS in the short run. In contrast, firms in the SC group are likely to undertake the largest earnings pressure because these firms either experience a small drop in EPS, which could possibly lead to managers missing the earnings target or experience a small increase in EPS, which could possibly just to meet the target. In either situation, managers have the strongest motivation to inflate EPS immediately by underinvesting in CSR.

We estimate Eq. (1) for both SC and LC subsamples separately, and present the results in Panel C of Table 5. The results show that although the coefficients of *LIQ* in both SC and LC subsamples are negative and significant, the liquidity effect is much stronger in the SC subsample. We also compare the coefficient estimates of *LIQ* between the two subsamples by conducting the *F*-test, and find a significant difference with the *p*-value of less than 0.01. The results that the negative effect of stock liquidity on CSR is stronger when managers' pressure to meet the short-term accounting performance is higher lend further support to our argument that higher liquidity strengthens managers' incentives to focus on short-term performance goals, which in turn discourages CSR investment, which is long-term in nature.

5.3. Alternative CSR measures

In this section, we verify that our results are not sensitive to alternative CSR measures. First, in addition to the strength scores for the six dimensions of CSR used in the main analysis, we create a measure that takes into account the concerns on firms' CSR performance. In particular,

we follow previous literature (e.g., Servaes and Tamayo, 2013; Di Giuli and Kostovetsky, 2014) and construct the net *CSR* score (*CSR_net*) as the difference between CSR strength scores and CSR concern scores. Second, we create a new *CSR* strength score (*CSR*7) by including the strength score of corporate governance as the seventh dimension of CSR when computing the CSR ratings.

Third, to overcome the issues of time-varying number of strength and concern indicators for each dimension over time (Deng, Kang and Low, 2013), we construct an adjusted *CSR* score (*CSR_adj*), computed as the difference between CSR strengthen indicators and CSR concern indicators scaled by the aggregated items using the range of scores within each year. We replace *CSR* with these alternative measures in Eq. (1) and re-estimate the regressions. Panel A of Table 6 tabulates the coefficients of stock liquidity. We find that stock liquidity has a negative and significant effect on all three CSR measures, suggesting that our findings are not driven by the measurement of CSR in our main analysis.

[Insert Table 6 about here]

Furthermore, we also consider CSR measures from other sources to ensure that our results are not driven by the particular coverage of firms and the specific methodology in collecting the CSR performance information by the KLD database. We obtain environmental ratings and social ratings from two different CSR data providers, i.e., Thomson Reuters' ESG database and Sustainalytics. In particular, we extract the overall ESG score, the three category scores in the environmental dimension, and four category scores in the social dimension from Thomson Reuters' ESG database, and retrieve the environmental score and the social score from Sustainalytics. We then repeat the previous analysis using CSR measures from these two

alternative data sources, and report the results in Panels B and C of Table 6, respectively. We find that our conclusion remains similar.

5.4. The real effect of stock liquidity on corporate social performance

To shed light on the specific CSR activities that are adversely affected by stock liquidity, we further examine the real effects of stock liquidity on various variables concerning firms' environmental and social performance.

To measure firms' specific environment performance, we rely on U.S. EPA's Toxic Release Inventory (TRI) Program and Thomson Reuter's ESG database. Specifically, using the TRI data, we construct three variables: (1) *ReleasedWaste* is the log-transformed quantities of chemicals disposed or released into the environment scaled by total assets; (2)*TreatRatio* is a binary variable that equals one if the fraction of total waste that is treated, recycled or recovered for a firm is above the sample median, and zero otherwise; and (3) *PolPrev* is the log-transformed amount of waste reduced by pollution prevention activities scaled by total assets. Moreover, we create three additional variables using Thomson Reuter's ESG database: (4) *EnvExp* is the log-transformed total environmental expenditure scaled by total assets; (5) *CarbonOffset* is the log-transformed equivalent of the CO2 offsets, credits and allowances in tons purchased and/or produced by the company during the fiscal year scaled by total asset; and (6) *EMSCertPct* is the fraction of company sites or subsidiaries that are certified with any environmental management system.

[Insert Table 7 about here]

We empirically estimate the effect of stock liquidity on the above six variables and present the results in Panel A of Table 7. We find that stock liquidity has a positive and significant effect on the amount of released pollutants but a negative and significant effect on the amounts of

chemical wastes treated and environmental expenditures, highlighting the potential adverse incentives created by stock liquidity in affecting firms' environmental performance.

Next, we turn to the influence of stock liquidity on firms' social-related activities. We employ four variables that capture firms' social performance in employment treatment and corporate philanthropy. In particular, *Eoption* is the log-transformed non-executive option value per employee. *PensionFundRaio* is the log-transformed pension funding ratio calculated as pension assets over pension liabilities. *Donation* is the ratio of total amount of donations to firms' revenues. *GlassdoorRating* is a binary variable that equals one if a company's rating by employees in Glassdoor.com is above the sample median in a fiscal year, and zero otherwise. We replace *CSR* in Eq. (1) with the above four variables separately and re-estimate the regressions. The results reported in Table 7 Panel B show that firms with high stock liquidity reduce the benefits of employees by granting options with lower value to employees and contributing less to fund their future pension benefits, and accordingly employees also give lower ratings for these liquid firms. Furthermore, liquid firms also make fewer donations. In sum, the empirical evidence in this section complements our main analysis by exhibiting the real impacts of stock liquidity on firms' social performance in environmental and social aspects.

6. Conclusion

CSR is an intangible corporate asset that takes time to build and accrues gains for companies over time. As such, CSR requires long-term perspectives. In the paper, we examine how stock liquidity, an important stock market characteristic, affects managers' horizon problems and thus firms' incentives to engage in CSR activities. In particular, we propose two contrasting liquidity effects on firms' CSR performance. The governance view maintains that more liquid stocks promote the formation of blockholders, who can mitigate the agency problem

by monitoring and intervention, thereby fostering firms' CSR activities by aligning the interests of managers with firms' long-run prospects. On the other hand, the short-termism view posits that liquidity, which lowers the exit costs of investors chasing short-term profits, aggravates managerial myopia by pressuring managers to deliver near-term performance, thereby exacerbating firms' underinvestment in CSR activities.

Using a large sample of U.S. firms from 1994 to 2013, we find that stock liquidity negatively affects firms' CSR performance, which is consistent with the short-termism view of liquidity on firms' CSR. We employ various tests to establish the causal link from stock liquidity to CSR. Exploring how our results vary according to various firm and manager characteristics, 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 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 and more covenants on their bank debt. These findings further support our argument that liquidity incentivizes firms' underinvestment in CSR activities by exacerbating managerial short-termism.

Our findings document a detrimental effect of stock liquidity on firms' CSR performance through exacerbating managerial myopia, thus revealing a new determinant of CSR, particularly related to its horizon problems. This paper also highlights the potential disincentives created by liquidity in discouraging investments that can be beneficial for shareholders in the long run, and thus complements the findings of Fang, Tian, and Tice (2014) that stock liquidity impedes corporate innovation, which adds to the understanding of the real effects of stock liquidity on corporate policies.

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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 1994 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. *LIQ* is the annual relative effective spread multiplied by -100 so that higher values of LIQ indicate higher stock liquidity. 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. Annual relative effective spread is the arithmetic mean of the daily relative effective spread which is calculated as the average of all relative effective spread for each trade within the day. *Size* is defined as the natural logarithm of total asset. *Leverage* is the ratio of total debt and total asset. *Cash/Asset* is the ratio of cash over total asset. *ROA* is the return on asset computed as the net income divided by total asset. *MB* is the market-to-book ratio calculated as market value of equity divided by the book value of equity. Capex/Asset is defined as the capital expenditure divided by total asset. *Analyst* denotes the analyst coverage computed as the natural logarithm of (1+number of analysts following). 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* is the ratio of research and development expenses over total asset. *Ret* is the annual stock return compounded from the monthly stock returns within the fiscal year. 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	23,827	1.491	2.368	0.000	1.000	2.000
LIQ	23,827	-0.143	0.169	-0.167	-0.092	-0.051
Size	23,827	7.185	1.636	5.985	7.076	8.256
Leverage	23,827	0.198	0.173	0.025	0.180	0.311
MB	23,827	3.533	4.562	1.560	2.383	3.839
Cash/Asset	23,827	0.183	0.205	0.032	0.103	0.265
ROA	23,827	0.076	0.137	0.044	0.089	0.138
Capex/Asset	23,827	0.056	0.060	0.020	0.038	0.070
Analyst	23,827	2.176	0.711	1.674	2.206	2.730
R&D/Asset	23,827	0.262	2.333	0.000	0.004	0.065
Ret	23,827	0.180	0.608	-0.153	0.093	0.373

Panel B: Correlation matrix

	CSR	*LIQ*	*Size*	*Leverage*	*MB*	*Cash*	*ROA*	*Capex*	*Analyst*	*R&D*
LIQ	**0.166**									
Size	**0.543**	**0.458**								
Leverage	**0.055**	**0.087**	**0.369**							
MB	**0.068**	**0.052**	**-0.049**	**0.071**						
Cash/Asset	**-0.096**	**-0.105**	**-0.442**	**-0.421**	**0.179**					
ROA	**0.130**	**0.206**	**0.25**	**-0.017**	**0.026**	**-0.369**				
Capex/Asset	**-0.013**	0.011	**0.053**	**0.092**	-0.010	**-0.216**	**0.077**			
Analyst	**0.391**	**0.398**	**0.631**	**0.089**	**0.114**	**-0.107**	**0.175**	**0.139**		
R&D/Asset	**-0.038**	**-0.052**	**-0.133**	**-0.04**	**0.073**	**0.274**	**-0.379**	**-0.048**	**-0.042**	
Ret	**-0.039**	**-0.073**	**-0.079**	**-0.054**	**0.208**	**0.084**	**0.065**	**-0.055**	**-0.097**	0.002

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 1994 and 2013. *CSR* is the strength score by adding all the strength ratings of the six dimensions in KLD database, including community, diversity, employee relations, environment, human rights, and product quality. All other variables are defined as in Table 1. Industry fixed effect and year fixed effect are included. 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.

Dependent variable	*CSR*
LIQ	-2.958***
	(-12.9)
Size	1.077***
	(21.1)
Leverage	-1.848***
	(-9.8)
MB	0.049***
	(8.4)
Cash/Asset	1.245***
	(8.5)
ROA	0.544***
	(3.3)
Capex/Asset	1.893***
	(4.1)
Analyst	0.164***
	(3.1)
R&D/Asset	0.007
	(1.6)
Ret	-0.122***
	(-5.7)
Observations	23,827
Adj R-squared	0.402
Industry fixed effect & Year fixed effect	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 1994 and 2013. Panel A reports the results using alternative measures of stock liquidity. *Amihud* is the Amihud illiquidity multiplied by negative one, where Amihud illiquidity is computed as the annual average of the daily ratio of absolute value of stock return divided by dollar trading volume multiplied by one million. *Turnover* is the average value of the daily stock turnover within the fiscal year where daily stock turnover is computed as trading volume divided by shares outstanding. *Zero* is the percentage of trading days with zero returns in the fiscal year following Lesmond et al. (1999), we multiply it by negative one so that higher value of *Zero* indicates higher level of stock liquidity. *QuotedSpread* is the average value of the daily quoted bid-ask spread in the fiscal year, multiplied by -100. Panel B presents the regression results using the strength score for each of the six dimensions in the computation of *CSR* as the dependent variable. The dependent variables from column (1) to column (6) are the sum of strength scores for all the strength indicators in product dimension, diversity dimension, human rights dimension, employee relation dimension, environment dimension and community dimension, respectively. Panel C presents the additional robustness checks under different specifications. We use firm fixed effect instead of industry fixed effect in column (1), use Fama-MacBeth regression approach in column (2), exclude firm-years with zero CSR ratings in column (3). We also split the sample into before 2002 (<=2002) and after 2002, whose results are shown in columns (4) and (5) respectively. All regressions include the same control variables as those in Table 2, but their coefficients are note tabulated. Industry fixed effect and year fixed effect are included in all regressions unless otherwise specified. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% level, respectively.

Panel A: Alternative measures of stock liquidity

	Dependent variable: *CSR*			
	(1)	(2)	(3)	(4)
Liquidity variables	*Amihud*	*Turnover*	*Zero*	*QuotedSpread*
Liquidity Measure	-0.168***	-0.217***	-8.908***	-0.488***
	(-2.6)	(-5.1)	(-8.6)	(-10.1)
Observations	23,827	23,827	23,814	23,807
Adj R-squared	0.378	0.380	0.384	0.385

Panel B: CSR sub-indices

	(1)	(2)	(3)	(4)	(5)	(6)
	Product	Diversity	Human rights	Employee relations	Environment	Community
LIQ	-0.167***	-1.079***	-0.060***	-0.694***	-0.629***	-0.333***
	(-5.2)	(-12.8)	(-6.3)	(-8.7)	(-11.0)	(-6.3)
Observations	23,827	23,827	22,429	23,827	23,827	23,827
Adj R-squared	0.113	0.311	0.097	0.232	0.276	0.224

Panel C: Additional robustness tests

	(1)	(2)	(3)	(4)	(5)
	Firm fixed effects	Fama-MacBeth	Exclude zero CSR ratings	Before 2002	After 2002
LIQ	-1.990***	-3.333***	-3.364***	-2.426***	-2.920***
	(-10.3)	(-10.7)	(-6.6)	(-5.6)	(-12.9)
Observations	23,827	23,827	12,344	4,663	19,166
Adj R-squared	0.719	0.382	0.379	0.250	0.433

Table 4: Tests on endogeneity

This table presents the results on addressing endogeneity issues. The sample consists of firm-years jointly covered in the merged Compustat/CRSP database, TAQ, and the KLD database between 1994 and 2013. Panel A reports the results addressing specific omitted variable problems. In column (1), we control for industry fixed effect and state×year fixed effect. In column (2), we control for industry×year fixed effect. In column (3), we explicitly control for several variables that may affect CSR as well. *CSRConcern* is CSR concern score defined as the total sum of concern indicators from KLD database. *MediaCoverage* is the number of articles reported by media, divided by 100 from RavenPack. *Sentiment* is the average event sentiment score of all the articles reported by media from RavenPack. *CgovStr* is the number of strengths in corporate governance dimension in KLD database. *Litigation* is a dummy variable, which takes the value of 1 for firms in litigious industries such as Chemicals, Industrial and Commercial Machinery, Electronic and other Electrical Equipment, Retail Trade. In column (4), we combine the previous columns by including all the additional variables as in column (3), state×year fixed effect and industry×year fixed effect. To mitigate reserve causality concern, Panel B presents the results using long-lagged (i.e. at *t*-2 and *t*-3) value of stock liquidity as the liquidity measure and Panel C presents the results of panel vector autoregressive regression (PVAR) with 200 replications. Panel D, E, and F presents the results utilizing the quasi-natural experiment of stock liquidity – the decimalization in 2001. Panel D presents the results how (exogenous) change in liquidity affects change in CSR following Fang et al. (2009). Δ denotes the change in the variable from the fiscal year before decimalization (2000) to the fiscal year after decimalization (2002). Panel E presents the difference-in-differences (DiD) regression results based on a propensity-matched sample following Fang, Tian, and Tice (2014). *Treat* is a dummy variable equal to one if a firm is in the treatment group and zero if in the control group. Panel E column (2) also presents the CSR dynamics when performing the DiD analysis. $Before^{-1}$ 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 or three years) after the decimalization year and zero otherwise. Panel F presents another difference-in-differences analysis using low price dummy from 1998 to 2004 following Chang et al. (2017). *Post* is a dummy variable that equals one for fiscal years after 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. All regressions include the same control variables as those in Table 2, but their coefficients are not tabulated. Industry fixed effect and year fixed effect are included unless otherwise specified. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% level, respectively.

Panel A: Controlling for omitted variables

	(1)	(2)	(3)	(4)
Dependent variables	*CSR*	*CSR*	*CSR*	*CSR*
LIQ	-2.959***	-3.003***	-1.831***	-1.803***
	(-13.9)	(-12.0)	(-9.4)	(-8.8)
CSRConcern			0.081***	0.081***
			(2.9)	(2.8)
MediaCoverage			0.066**	0.063**
			(2.1)	(2.0)
Sentiment			0.012**	0.009
			(2.1)	(1.5)
CgovStr			1.172***	1.207***
			(11.4)	(11.1)
Litigation			0.241**	0.244*
			(2.0)	(1.9)
Observations	23,102	23,699	16,699	16,378
Adj R-squared	0.407	0.403	0.492	0.499
Fixed effects	Industry State×Year	Industry×Year	Industry and Year	State×Year Industry×Year

Panel B: Lagging the liquidity measure for two to three years

	Dependent variable: *CSR*	
Time of *LIQ*	At *t*-2	At *t*-3
LIQ	-2.543***	-2.089***
	(-14.1)	(-14.0)
Observations	21,966	20,370
Adj R-squared	0.409	0.413

Panel C: Estimating a panel vector autoregressive (pVAR) regression

	(1)	(2)
	CSR	*LIQ*
Lagged CSR	1.871***	0.033***
	(4.4)	(2.9)
Lagged LIQ	-3.368**	0.493***
	(-2.3)	(9.0)
Observations	18318	18318

Panel D: Change of CSR in response to (exogenous) change in stock liquidity

Dependent variable	Δ*CSR*
Δ*LIQ*	-1.018**
	(-2.1)
Observations	385
R-squared	0.127

Panel E: Conducting a matched sample analysis using the DiD approach

	(1)	(2)
Dependent variable	*CSR*	*CSR*
Treat×*Post*	-0.528***	
	(-3.8)	
Treat×*Before*$^{-1}$		-0.073
		(-0.6)
Treat×*Current*		-0.224
		(-1.5)
Treat×*After*^{1}		-0.450***
		(-2.8)
Treat×*After*$^{2\&3}$		-0.696***
		(-3.2)
Before^{-1}		0.067
		(0.7)
Current		0.234*
		(1.9)
After^{1}		0.435***
		(2.8)
After$^{2\&3}$		0.672***
		(3.2)
Observations	1,576	1,576
Adj R-squared	0.879	0.879
Controls, Firm FE	Yes	Yes
Year FE	Yes	No

Panel F: DiD with low-priced stocks

	(1)	(2)
Dependent variable	*CSR*	*CSR*
LowPrc×Post	-0.378***	
	(-3.4)	
LowPrc×Before $^{-1}$		-0.133
		(-1.3)
LowPrc×Current		-0.224*
		(-1.8)
LowPrc×After ^{1}		-0.306**
		(-2.1)
LowPrc×After $^{2\ \&3}$		-0.563***
		(-3.2)
Before $^{-1}$		0.180**
		(2.4)
Current		0.280***
		(2.9)
After ^{1}		0.394***
		(3.5)
After $^{2\ \&3}$		0.658***
		(4.4)
Observations	2,937	2,937
Adj R-squared	0.860	0.860
Controls, Firm FE	Yes	Yes
Year FE	Yes	No

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. Ownership data is obtained from Thomson Reuters 13F database. *IO* is the total institutional ownership. *STIO* and *LTIO* denote the short-term institutional ownership and long-term institutional ownership respectively following the definitions of Yan and Zhang (2009). *TRAIO, QIXIO,* and *DEDIO* are transient, quasi-indexer, and dedicated institutional ownership respectively based on the Bushee (1998, 2001) classification. 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. *HighAnalyst* is a dummy variable which equals to one if there are above-median number of analysts following the firm in a given year and zero otherwise. *HighCovInt* is a dummy variable which takes the value of one if the number of bank loan covenants a firm is subject to is above the median value in a given year and zero otherwise, where the specific covenant restrictions used are secured debt, more than two financial ratios, asset sweep, debt sweep, dividend restrictions, and equity sweep. We obtain these bank loan data from DealScan. *IndMAInt* measures the industry-year level takeover intensity faced by firm *i*, calculated as the number of all announced and completed takeovers (e.g., targets) in firm *i*'s industry and year *t*-1 scaled by the number of firms in that industry and year *t*-1. *HighTakeoverProb* is a dummy variable that equals 1 if the probability of being a target in takeover is above yearly median and zero otherwise. The probability is estimated following Cremers, Nairs, and John (2009). In Panel C, we report the results of how performance pressure affects the relationship between liquidity and CSR. We proxy for performance pressure using the absolute percentage change of earnings per share (EPS) from last year to this year, where EPS is obtained from IBES. To construct the measure, we first classify firm-years into positive change of EPS and negative change of EPS, and then split the sample according to median value of percentage change of EPS within each group. *Small Change* denotes firm-years with small increase in EPS and small decline in EPS while *Large Change* denotes firms otherwise, namely large increase in EPS and large decline in EPS. All regressions include the same control variables, industry fixed effect and year fixed effect as those in Table 2, but their coefficients are not tabulated. 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)	(3)
Dependent variable	*CSR*	*CSR*	*CSR*
LIO	-1.542***	-2.165***	-2.689***
	(-5.7)	(-8.0)	(-8.0)
LIQ×IO	-2.727***		
	(-4.6)		
IO	-1.375***		
	(-7.7)		
LIQ×STIO		-5.160***	
		(-5.4)	
LIQ×LTIO		3.425***	
		(4.2)	
STIO		-1.811***	
		(-8.9)	
LTIO		0.530***	
		(2.7)	
LIQ×TRAIO			-1.679**
			(-2.1)
LIQ×QIXIO			-0.735
			(-0.9)
LIQ×DEDIO			0.985***
			(3.4)
TRAIO			-1.169***
			(-6.2)
QIXIO			-0.282
			(-1.5)
DEDIO			0.322***
			(3.3)
Observations	23,827	23,827	23,827
Adj R-squared	0.409	0.411	0.405

Panel B: Degree of managerial myopia

Dependent variable	(1) *CSR*	(2) *CSR*	(3) *CSR*	(4) *CSR*	(5) *CSR*	(6) *CSR*
LIQ	-3.455***	-4.526***	-2.790***	-1.716***	-1.641***	-2.648***
	(-7.1)	(-12.0)	(-13.1)	(-4.0)	(-5.219)	(-12.750)
LIQ×IndMAInt	-2.924***					
	(-4.926)					
IndMAInt	-0.639***					
	(-4.936)					
LIQ×HighTakeoverProb		-0.852**				
		(-2.481)				
HighTakeoverProb		-0.321***				
		(-4.269)				
LIQ×WPS			-0.523***			
			(-3.0)			
WPS			-0.087**			
			(-2.5)			
LIQ×AGE63				-1.127*		
				(-1.8)		
AGE63				-0.377***		
				(-4.1)		
LIQ×HighAnalyst					-0.613*	
					(-1.9)	
HighAnalyst					-0.383***	
					(-4.2)	
LIQ×HighCovInt						-1.577***
						(-3.8)
HighCovInt						-0.526***
						(-5.4)
Observations	23709	23827	14,900	17,329	23,827	13,087
Adj R-squared	0.403	0.403	0.417	0.427	0.403	0.390

Panel C: Performance pressure

	(1) *CSR*	(2) *CSR*	(3) *Coefficient Diff.*
Absolute percentage change of EPS	*Small Change (SC)*	*Large Change (LC)*	*SC - LC*
LIQ	-4.134***	-2.076***	-2.058***
	(-11.4)	(-9.8)	*p*-value = 0.000
Observations	13,093	10,205	
Adj R-squared	0.445	0.329	

Table 6: Alternative CSR measures

This table presents the results using alternative CSR measures and CSR measures from alternative data sources. Panel A reports alternative CSR measures from KLD database. *CSR_net* is the net CSR score computed by subtracting the concerns scores for all the six dimensions from the strength scores (*CSR*). *CSR*7 is the CSR strength score computed by adding the strength score for another dimension – corporate governance to the existing CSR strength score (*CSR*). *CSR_adj* is the adjusted CSR scores computed by summing all strengthen indicators and minus all concern indicators scaled by the aggregated items using the range of scores within each year. Panel B presents the results using ESG scores from Thomson Reuters' ESG database – overall ESG score and the three category scores from the environmental dimension and four category scores from social dimension. Panel C presents the results using total ESG score, environmental score and social score obtained from Sustainalytics. All regressions include the same control variables, industry fixed effect and year fixed effect as those in Table 2, but their coefficients are not tabulated. 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: Alternative measures of CSR

	(1)	(2)	(3)
Dependent variables	*CSR_net*	*CSR*7	*CSR_adj*
LIQ	-1.740***	-3.386***	-0.308***
	(-8.4)	(-13.3)	(-7.1)
Observations	23,827	23,827	23,821
Adj R-squared	0.190	0.381	0.174

Panel B: Thomson Reuters ESG measures

	Overall ESG	Environment			Social			
	Total ESG Score	Resource Use Score	Emissions Score	Environmental Innovation Score	Workforce Score	Human Rights Score	Community Score	Product Responsibility Score
LIQ	-27.441***	-33.255***	-27.958***	-12.049	-42.867***	-20.529	-9.329	-28.624***
	(-4.0)	(-2.9)	(-2.8)	(-1.3)	(-4.3)	(-1.6)	(-1.0)	(-2.6)
Observations	5,644	5,644	5,644	5,644	5,644	5,644	5,644	5,644
Adj R^2	0.429	0.374	0.384	0.099	0.309	0.274	0.231	0.182

Panel C: Sustainalytics measures

	(1)	(2)	(3)
	Total ESG Score	*Environmental Score*	*Social Score*
LIQ	-14.144*	-27.294**	-13.433
	(-1.8)	(-2.3)	(-1.6)
Observations	3,165	3,165	3,165
Adj R-squared	0.319	0.358	0.284

Table 7: Real effects of stock liquidity on corporate social responsibility

This table presents the results of the effects of liquidity on firm's real activities. Panel A reports the results for environment-related activities while Panel B shows the results for social-related activities. *ReleasedWaste* is the log-transformed quantities of chemicals disposed or released into the environment scaled by total assets. *TreatRatio* is a dummy variable which equals to one if the fraction of total waste that are treated, recycled or recovered for the firm is above the sample median. *PolPrev* is the log-transformed amount of waste reduced by pollution prevention activities scaled by total assets. The above three variables are obtained from the US EPA Toxics Release Inventory (TRI) database. *EnvExp* is the log-transformed total environmental expenditure scaled by total assets obtained from Thomson Reuter's ESG database. *CarbonOffset* is the log-transformed equivalent of the CO2 offsets, credits and allowances in tonnes purchased and/or produced by the company during the fiscal year scaled by total asset obtained from Thomson Reuter's ESG database. *EMSCertPct* is the fraction of company sites or subsidiaries that are certified with any environmental management system obtained from Thomson Reuter's ESG database. *Eoption* is the log-transformed employee option per employee. *PensionFundRaio* is the log-transformed ratio of pension asset divided by pension liability measuring the funding ratio of pension benefits. *Donation* is the ratio of total donation to revenues. *GlassdoorRating* is a dummy variable which equals to one if the company's rating by employees in Glassdoor.com is above the sample median in a fiscal year and zero otherwise. All regressions include the same control variables, industry fixed effect and year fixed effect as those in Table 2, but their coefficients are not tabulated. 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: Environmental aspect

	(1)	(2)	(3)	(4)	(5)	(6)
	ReleasedWaste	*TreatRatio*	*PolPrev*	*EnvExp*	*CarbonOffset*	*EMSCertPct*
LIQ	2.700***	-0.220**	-1.052**	-6.781***	-29.508**	-1.061*
	(3.0)	(-2.1)	(-2.2)	(-4.0)	(-2.2)	(-1.8)
Observations	6,937	7,201	4,502	986	320	468
Adj R-squared	0.294	0.126	0.280	0.169	0.272	0.353

Panel B: Social aspect

	(1)	(2)	(3)	(4)
	Eoption	*PensionFundRaio*	*Donation*	*GlassdoorRating*
LIQ	-0.677***	-0.116***	-0.009*	-0.288**
	(-3.3)	(-2.8)	(-1.7)	(-2.2)
Observations	18,047	6,901	1,648	4,594
Adj R-squared	0.250	0.172	0.080	0.093

Appendix

Table A1: 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 1994 and 2013.

Year	N	Percentage
1994	456	1.91
1995	467	1.96
1996	475	1.99
1997	468	1.96
1998	459	1.93
1999	464	1.95
2000	463	1.94
2001	704	2.95
2002	707	2.97
2003	1,741	7.31
2004	1,805	7.58
2005	1,731	7.26
2006	1,719	7.21
2007	1,675	7.03
2008	1,759	7.38
2009	1,862	7.81
2010	1,765	7.41
2011	1,749	7.34
2012	1,715	7.2
2013	1,643	6.9
Total	23,827	100.00

Table A2: Diagnostics for Propensity score matching

This table presents the diagnostic results for propensity score matching approach for DiD analysis of stock liquidity on CSR surrounding the decimalization year. It 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. ***, **, and * indicate statistically significant at the 1%, 5%, and 10% level, respectively.

	Treatment group	Control group	Difference	*p*-value
LIQ	-0.226	-0.233	0.008	0.868
Size	7.988	8.064	-0.076	0.723
Leverage	0.234	0.233	0.001	0.974
MB	4.896	4.340	0.556	0.661
Cash/Asset	0.105	0.099	0.005	0.820
ROA	0.117	0.111	0.006	0.648
Capex/Asset	0.063	0.059	0.004	0.569
Analyst	2.486	2.533	-0.047	0.663
R&D/Asset	0.034	0.040	-0.007	0.509
Ret	0.085	-0.003	0.088	0.256