Debt Markets Retort to Mandatory Corporate Social Responsibility

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Abstract

This paper delves into the debt market's reaction to mandatory corporate social responsibility (CSR). Employing mandatory CSR rule under the Indian Companies Act 2013 as an identification strategy, I discover that firms adhering to mandatory CSR face a significant 43 basis point rise in yield spread, marking a departure from other Act provisions designed to decrease debt costs. This rise is largely ascribed to the negative influence of mandatory CSR on expected cash flows. Additionally, through developing an application built using the advanced large-language model, I clarify the distinct effects of mandatory CSR governance versus expenditure. While the former incrementally increases the amount issued to sales ratio by 1.2%, the latter predominantly fuels the yield spread hike. This investigation illuminates the nuanced interplay between mandatory CSR and debt market movements.

KEYWORDS: Corporate Social Responsibility (CSR), Debt Markets, Indian Companies Act 2013, Free Cash Flow.

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I. INTRODUCTION

In academic discussions of Corporate Social Responsibility (CSR), it is commonly acknowledged that markets are not always capable of efficiently pricing and providing public goods. However, it is emphasized that firms cannot and should not be expected to voluntarily act in socially or environmentally responsible ways and should focus on profit maximization. Managing externalities and providing public goods is the role of governments, as public preferences and democratic empowerment guide them. This separation of corporate and government responsibility toward society is commonly referred as the classical dichotomy (Friedman, 1970). Recently research has shifted from debating the existence of CSR to examining its impact on the economy, shareholder value, and stakeholder welfare. Research in this area concentrated on understanding the motive of CSR - value creation (or win-win scenario), delegated philanthropy (Benabou and Tirole, 2010), or manifestation of agency problems.[1] However, in all these studies, CSR is voluntary and therefore, hard to disentangle the motive that drives the results. To address this limitation, I examines the influence of CSR on debt markets in India, where the government has imposed a mandatory CSR spending requirement for profitable firms. This unique setting allows me to investigate how mandatory CSR affects the pricing of debt securities.[2]

Past studies exploring the relation between CSR and credit markets (or debt markets) found a negative association between CSR and the cost of debt. For instance, Oikonomou, Brooks, and Pavelin (2014) and Cooper and Uzun (2015) examined the impact of CSR on

[1]Flammer, 2015; Hong, Kubik, and Scheinkman, 2012; Edmans, 2011; Lins, Servaes, Tamayo, 2017. For reviews of the literature on CSR, see Griffin and Mahon (1997), Orlitzky and Benjamin (2001), Orlitzky, Schmidt and Rynes. (2003), Margolis and Walsh (2003), Margolis, Elfenbein, and Walsh (2009) and Kitzmueller and Shimshack (2012). Detail discussion of past literature is provided in the next section.

[2]On 29th August 2013, India passed the mandatory CSR rule (Clause 135) under Indian Companies Act 2013. As per this rule, if during any fiscal year a firm has either (1) a net worth of Indian Rupees (INR) 5,000 million (about U.S. $83 million) or more; (2) sales of INR 10,000 million (about U.S. $167 million) or more; or (3) a net profit of INR 50 million (about U.S. $0.83 million) or more, it is required to spend 2% of its average net profits of the last three years on CSR related activities.

credit ratings and the cost of debt. They found that if a firm engages in CSR activities, its credit rating increases and its cost of debt decreases. Goss and Roberts (2011) similarly found that CSR firms have a lower cost of bank loans than non-CSR firms. However, in all these studies, the choice to conduct CSR is voluntary. Hence, it is difficult to ascertain whether the observed associations between CSR and cost of debt (i) are causal in nature; or (ii) are merely attributable to model misspecification due to the influence of unobserved firm level heterogeneity related to CSR (Himmelberg, Hubbard and Palia 1999). Also, as highlighted by Hong, Kubik and Scheinkman (2012), reverse causality can drive the results as firms that are doing well, and are hence less financially constrained, are more likely to spend resources on CSR activities. Hence, spending on CSR signals about the firm performance and that signal helps in reducing the cost of debt. In sum, the correlation between CSR and the cost of debt, documented by earlier studies, albeit interesting, does not necessarily warrant a causal interpretation. As existing empirical evidence suffer from potential endogeneity concerns such as reverse causality or omitted variable bias (Margolis, Elfenbein, and Walsh, 2009), mandatory CSR rule in India allows one to explore the causal link between CSR and the cost of debt. The reason for focusing on the debt market is two-fold. First, mandatory CSR expenditure is a direct hit to current cash flows needed for interest payment and future cash flows by current investment and this can change the bond pricing. Second, companies often engage in the debt market more frequently than in the equity market. Therefore, the impact of mandatory CSR on repeat issuances of debt is also analyzed.

Using the bond issuances from three years before the enactment date (29th August 2013) to three-year post, I used difference-in-differences and multi-dimensional regression discontinuity design (RDD) techniques to investigate the impact of mandatory CSR on the yield, yield spread, and amount issued. The analysis excluded preferred stock issues and bonds with features such as step-up and convertible bonds to ensure the focus remained on standard bond issuances. The firm characteristics were collected from CMIE's ProwessDx database,

which is extensively cited in studies focusing on the Indian market. Due to the absence of the main identifier (ISIN) for many Indian firms in the SDC database, a merging process was conducted by utilizing fuzzy matching techniques based on firm names, followed by manual verification of the matches. This meticulous process resulted in a final sample size of 183 firms and a total of 2,413 bond issues analyzed over a six-year period spanning from August 30th, 2010 to August 30th, 2016.

Empirical analysis shows that the mandatory CSR rule increases the yield spread by 43 basis points for the affected firms compared to others. Debundling the impact of other requirements of the Act from mandatory CSR rule exhibits that while the former helped reduce the yield spread, the mandatory CSR rule counteracted those benefits for the affected companies. These results are comparable to Klock, Mansi, and Maxwell (2013) which show that the strong antitakeover governance provisions reduces the cost of debt by 34 basis points compare to other group. Although here focus is not on antitakeover provisions but impact of governance on cost of debt is comparable. Adjusting for bond characteristics, firm characteristics, and industry-fixed effects using difference-in-differences specification, the yield spread of bonds issued by affected firms increased to 103 basis points compared to bonds issued by unaffected firms. To ensure the accuracy of these results, I conducted a multi-dimension regression discontinuity design (MRDD) to identify the varying effects of the rule on firms that just met the CSR cutoff compared to those that narrowly missed the cutoff. This allowed for a more precise examination of the effects of the CSR rule on these specific sets of firms. The results indicated that the yield and yield spreads for bonds issued by firms that just met the criteria were higher than the yield and yield spreads for bonds that just missed meeting the CSR criteria. The mandatory CSR had a positive and significant impact on yield-spreads. To further investigate, I analyzed the impact of each of the three criteria used to determine whether a firm is subject to the CSR mandate and found that bonds issued by firms that were subject to mandatory CSR spending based on

the individual criteria also had higher yields and yield spreads.

Although I have reported an increase in the yield and yield spread of the affected firms after the implementation of the CSR rule, I have not fully explained how this occurred. However, after conducting a two-stage least square regression model, I have found that the mandatory CSR rule impacted the yield and yield spread through the future free cash flow (FCF). Implementing CSR activities using 2% of the profits resulted in a decrease in FCF, which led to an increase in yield and yield spread.

This shows that implementing mandatory CSR actually harms the bond market and outweighs any potential benefits. By requiring companies to engage in CSR activities, they lose the flexibility to invest in ways that generate future cash flow to meet debt obligations. This lack of flexibility negatively impacts how the market views the value of their bonds, ultimately leading to higher capital costs for the company. Additionally, companies are limited to a pre-approved list of CSR activities, some of which may provide private benefits to company insiders, further exacerbating moral hazard.

There appears to be a discrepancy in the yield spread of companies affected by the CSR rule, which I believe is due to a lack of transparency in CSR spending. To investigate this issue, I gathered data from NSE Infobase on CSR expenditure, which provides information on firm-level spending, the categories of CSR projects, the amount allocated and spent, and the geographic location of these projects. While the data doesn't provide information on the amount spent on individual projects, it does reveal that 80-90% of affected firms spent less than required under the CSR rule, and that 40-50% of CSR projects and 60-65% of CSR spending is focused on poverty, healthcare, education, and rural development. This suggests that the mandatory CSR rule is based on a 'Comply and Explain' basis. To test whether reducing information asymmetry on CSR expenditure disbursement is rewarded by the debt market, I analyzed the details on CSR expenditure. I found that affected firms which disburse the amount close to the prescribed and disclose the name of the agencies used for

CSR expenditure are penalized less by the debt market. This supports the argument that firms are rewarded by the capital markets for reducing information asymmetry regarding CSR amount disbursement. It's important for firms to be transparent about their CSR spending, as this can have an impact on their yield spread and debt market penalties.

Next, I explore the distinct effects of mandatory CSR expenditure and governance. Iliev and Roth (2022) posit that boards with sustainability expertise not only enhance a firm's overall sustainability performance but also increase the likelihood of forming a sustainability committee. In contrast, the Indian CSR rule mandates both a 2% CSR expenditure and the formation of a CSR committee. The committee's role involves crafting the CSR policy, recommending expenditure levels, and periodically monitoring the policy's implementation. This dual mandate complicates the identification process, making it challenging to discern whether the observed changes in yield spread and amount issued among affected firms are due to mandatory CSR expenditure or governance. To address this, I gather information on CSR committees and the implementation of CSR activities from CSR reports, utilizing 'ESG app', an application grounded in an advanced large-language model.[3] By considering the number of CSR committee members as a proxy for mandatory CSR governance, I find that it increases the amount issued to sale by 1.2% for affected firms but does not influence the yield spread. This indicates that the effect on yield spread is predominantly driven by mandatory CSR expenditure.

Furthermore, I delved into how corporate governance and ownership structure affects the relationship between bond pricing and mandatory corporate social responsibility (CSR). I show that firms with high promoter holdings or government ownership tend to have a higher yield spread, indicating that they may not be utilizing their mandatory CSR spending as effectively. On the other hand, business group-affiliated firms tend to have a lower yield spread,

[3]A detailed discussion on the large-language model and the development of the 'ESG app' application is presented in the methodology section.

possibly because they can coordinate their CSR spending with other firms in the group. On examining the corporate governance effect on bond pricing, I found that companies with strong external governance, such as a significant number of independent directors or the appointment of BIG4 auditors, were found to have lower yield spreads. This suggests that better-governed companies are better equipped to plan their corporate social responsibility spending and maximize the strategic benefits of such activities.

Overall, I show that the enactment of Act reduced debt costs, as seen in bonds of unaffected firms. However, the mandatory CSR regulation had adverse effects and nullify the benefits of other provisions of the Act for affected firms. This caused a 103 basis points increase in the yield spread for the affected firms compare to unaffected ones. In response, affected firms reduced the amount issued (liquidity). The higher yield spread was due to the decrease in the firms' future cash flow, which makes it difficult to manage financial challenges. Nevertheless, strong governance, belonging to a bigger group, and transparently disclosing the utilization of CSR funds can alleviate the negative consequences of compulsory CSR.

I make several contributions to the literature. First, I provide a causal link between CSR and cost of debt. Establishing causality between CSR and cost of debt is difficult due to potential confounding factors that may also contribute to a firm's decision to engage in CSR. To overcome this hurdle, I use a difference-in-differences and MRDD around regulatory change which forced certain firms to spend on CSR, as a mechanism to examine whether CSR indeed affects yield and yield spread. This research setting significantly mitigates endogeneity concerns and makes it more likely that changes in cost of debt around the event can be attributed to CSR. Second, I unbundled the impact of other requirements of Act from mandatory CSR rule. The unbundling further strengthens the identification and show that, although other requirements of the Act reduced the cost of debt, but the mandatory CSR rule reduced those benefits to the affected firms. Hence, unbundling helped in understanding the increase in the yield spread for the affected firms compare to unaffected ones.

Third, firms participate in the debt market frequently compare to equity market. I further investigate whether the positive relation between CSR and yield spread changes with repeat issuances. I find that yield spread increases further if the affected firm issues debt repeatedly. This is intuitive as firms get affected by the rule repeatedly and keep on issuing debt to compensate, the debt market incorporates the risk to the cash flows and would demand a higher yield. Fourth, acknowledging the role of ownership and corporate governance in bond pricing (Anderson, Mansi, and Reeb (2003)), I explore how ownership and governance measures affect this positive relationship between CSR and yield spread. I show that strong governance system and belonging to a bigger business group helps in mitigating the cost of mandatory CSR rule up to certain extent. This results that better governance system reduces the cost of debt is in line with the past literature (Bhojraj and Sengupta (2003)). Fifth, using the details on CSR expenditure, I find that affected firms, which behaved as good CSR citizens by maintaining the transparency on expensing CSR amount and provides the details on NGOs used for dispensing it, penalized less by the debt market. This supports the literature which shows reduction in information asymmetry or improving transparency helps in reducing the cost of capital. (Duffie and Lando (2001)).

Sixth, this paper also contributes to the growing body of research on CSR/ESG governance, particularly focusing on the establishment of CSR committees and the management and implementation of CSR activities. Iliev and Roth (2023) highlight that boards with enhanced sustainability expertise can improve a firm's overall sustainability performance by 7.1%, with gains evident in both environmental and social practices. Similarly, Dyck, Lins, Roth, Towner, and Wagner (2023) argue that board renewal mechanisms are essential for aligning investor preferences with actual environmental sustainability practices within firms. Their research, which examines the adoption of majority voting for directors and the inclusion of female directors as governance mechanisms, finds a significant positive correlation with future environmental performance. Building on this discourse, my study disentangles

the effects of mandatory CSR expenditure from those of CSR governance. I demonstrate that while debt markets penalize firms subject to mandatory CSR by increasing yield spreads due to potential cash flow losses, these firms can offset some of the negative impacts by exhibiting robust CSR governance. Firms with stronger CSR governance mechanisms are able to raise larger amounts, indicating a market recognition of their governance efforts despite the cost implications of mandatory CSR expenditure. Lastly, this paper contributes to another growing literature that is 'AI in Finance' (especially usage of large language models (LLMs)) which discusses the use of LLMs for predicting asset prices or retrieving information from documents.[4] Using large-language model to retrieve information on CSR governance from CSR reports, I contribute towards this new emerging literature.

Like any other study, this has also limitations. First, generalizability can be an issue. It can be argued that the mandatory CSR activities prescribed by the Act 2013 are different in nature from the voluntary CSR seen in the rest of the world. Although the findings are relevant to India, it is unclear whether these findings can be applied to other parts of the world which have different economic and regulatory environments. Despite these generalizability limitations, the key findings of this paper have implications for efforts to encourage CSR in other economies. Second, due to positive correlation between stock prices and bond yields through their shared component- cash flows (Shiller and Beltratti, 1992; Campbell and Ammer, 1993), one can argue that it is unsurprising to discover similar findings to those of Machiraju and Rajgopal (2017). However, it is essential to acknowledge that this correlation is not constant and can be influenced by many factors - different expectations of future cash flows by the stock market and bond market, composition effect (bond issuer firms might be different from those covered in Machiraju and Rajgopal (2017)), and macroeconomic factors such as business cycles, inflation, monetary policy, and volatility (Campbell and Taksler (2003)). Gulko (2002) has also provided research supporting this notion. There-

[4]See, Gabaix et al. 2023, Lopez-Lira and Tang (2023), and similar other papers.

fore, analyzing the yield spread is employed to obtain an independent perspective on the bond market while mitigating the influence of the stock market. Nevertheless, stock return volatility could be a link between stock returns and the bond market, as volatility hurts bondholders because it increases the probability of default; however, it has a positive effect on equity holders. Thus, volatility drives up the yield and yield spread for new and seasoned corporate bonds (Campbell and Taksler (2003)). To mitigate such concerns, I show that the results are robust even controlling for stock return volatility.

Third, as information on voluntary CSR by the affected firms in the pre-rule period is not available, this can generate an upward bias. To overcome this concern to an extent, I use the CSR ratings by Karmayog (non-profit organization) to know whether affected firms did CSR in the pre-rule period. Unfortunately, Karmayog generates CSR rating only for top 500 firms. Using fuzzy matching and manual check, I could able to match 74 firms (out of 103) which did CSR voluntarily and also issued bonds in the pre-CSR rule period. Using this voluntary CSR data on affected firms, I confirm my findings that mandatory CSR increase the cost of debt but firms which were involved in voluntary CSR in pre-rule period penalized less.

Despite the limitations, this study contributes to the literature and conveys that mandatory CSR increases the cost of debt by affecting the cash flow. However, a better governance system and transparency in CSR expenditure can marginally mitigate the cost of CSR. The next section provides a brief review of the literature. Section III describes my data and methodology. Section IV presents my results, and Section V offers the conclusions.

II. RELATED LITERATURE

Debate on CSR has moved from whether it should exit or not to how it affects the firm value and how investors perceive CSR expenditure in securities pricing?' [5] About the impact of CSR on firm value, theoretical as well as empirical papers provide mix results in evaluating the relation between CSR performance and firm value. One set of theoretical papers concludes that CSR could create value either by increasing cash flow or by decreasing discount rate (see, Baron (2007, 2008); Fatemi et al. (2015); Albuquerque et al. (2019)). Other sets of papers argue that CSR activities could reflect managerial agency problems and that corporate managers engage in these activities in order to enhance their own utility rather than the welfare of shareholders (Benabou and Tirole (2010)). This argument reflects the possibility that firms with greater value or performance have the capability to expend resources on CSR activities (Hong et al. 2012), a version of a free cash flow agency problem. In this case, the causality is in the opposite direction. Regarding empirical evidence, Margolis, Elfenbein, and Walsh (2009) in meta-analysis of 167 studies, find that some studies document a positive effect when they regress firms' financial performance (either accounting based ROA or stock returns) on corporate goodness while others find a negative effect. [6]

[5]On the debate about the existence of CSR and the 'objective of the firm', over the course of several decades, scholars from various disciplines have put forth and extensively discussed a wide range of firm 'objectives.' These include, but are not limited to, shareholder value maximization (Berle (1932); Friedman (1970); Jensen and Meckling (1976)), stakeholder theory (Freeman (1984)), long-term firm value maximization (Jensen (2002)), shareholder welfare maximization (Hart and Zingales (2017)), and shareholder wealth maximization with stakeholder interests (Bhagat and Hubbard (2020); Edmans (2020)). On one extreme, stakeholder governance (or stakeholderism) suggests that a firm should invest in public goods through CSR as it improves the efficiency of implicit contracting between a firm and stakeholders. Thus, social, environmental or ethical preferences of stakeholders can induce CSR activities (Baron (2001), McWilliams and Siegal (2001)). Such strategically motivated CSR activities can be profitable and the management literature terms this thesis as "doing well by doing good." On the other extreme, Friedman argues that CSR involves managers spending shareholders' money and CSR is a waste of the firm's valuable resources that should be utilized for increasing the firm value.

[6]See, Masulis and Reza (2015), Servaes and Tamayo (2013), Humphrey et al. (2012) for negative relation between CSR and firm value, and Gillan et al. (2010), Gao and Zhang (2015), Borghesi et al. (2014), Ferrell et al. (2016), Iliev and Roth (2020), and Liang and Renneboog (2017a) for positive relation between CSR and firm value. Friede et al. (2015) conducted the meta-analysis of this literature and conclude: "Roughly 90% of studies find a nonnegative ESG/CFP [Corporate financial performance] relation. More importantly,

In terms of cost of capital, Dhaliwal, Li, Tsang, and Yang [2011] conclude that the voluntary disclosure of CSR activities (i) attracts institutional investors and analysts; and (ii) reduces the firm's cost of capital. Chava (2014) finds that the cost of capital (both equity and debt) is higher for firms with poor environmental profiles. In addition, Ng and Rezaee (2015) conclude that a negative relationship exists between environmental and governance performance and the cost of equity capital, but no such relationship exists for social performance. Breuer et al. (2018) estimate that the relation between CSR performance and firms' cost of capital is conditional on the investor protection laws in the country in which the firm is located; higher ESG/CSR performance reduces (increases) the cost of capital in countries with strong (weak) investor protection. Goss and Roberts (2011) examine ESG/CSR concerns and find that firms with greater concerns pay higher interest rates on their bank loans. In sum, when CSR is voluntary, the cost of capital reduces with expenditure.

While these studies have intuitive results, it is difficult to infer causality. The level of CSR activity is an endogenous choice of the firm, and it is likely that well-performing firms engage in CSR activity. Therefore, it is hard to disentangle the effect of CSR from the strategic investment behavior of management. Several researchers have tried to resolve the endogeneity issue and the associated reverse causality problems. Chen, Hung and Wang (2017) examined how mandatory CSR disclosure impacts firm performance in China. China made CSR disclosure mandatory for a subset of firms in 2008. Using this as an exogenous shock, the authors examined how CSR activities affect the profitability and social externalities of firms listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange from 2006-2011. They found that treatment firms experience a decrease in return on assets (ROA), return on equity (ROE), and sales revenue and increases in operating costs and impairment charges. On the other hand, the industrial wastewater discharge and the level of SO2 emissions were reduced after the CSR disclosure mandate. As mandatory CSR disclosure does not suggest

the large majority of studies reports positive findings."

significant CSR expenditure, it does not fully resolve the endogeneity issue. Therefore, I consider the implications of mandatory CSR in India, as imposed by the Companies Act to investigate how debt markets price CSR expenditure.

I acknowledge that this is not the first paper that has used mandatory CSR rule under the Companies Act 2013 for identification. Manchiraju and Rajgopal (2017) used this unique setting to examine the impact on shareholder value, and found a significant negative abnormal return associated with the passage of the CSR rule. The companies that advertise their CSR activity do not have negative abnormal returns. They concluded that mandatory CSR has a negative impact on shareholder value. Using the hand-collected data on CSR expenditure, Dharmpala and Khanna (2018) show that the firms pivot their CSR expenditure around the cut-off i.e., firms initially spending less than 2% increased their CSR activity, large firms initially spending more than 2% reduced their CSR expenditures. Using the same exogenous shock, Rajgopal and Tantri (2022) confirm the finding of Dharmapala and Khanna (2018) that firms that voluntarily engaged in CSR before the mandate reduce their CSR spending afterward. They also suggest that despite increasing advertisement expenditure likely to offset the lost signaling value of voluntary CSR, stock prices and operating performance of former voluntary CSR spenders who qualify under the law decline. Due to the positive correlation between stock prices and bond yields through their shared component- cash flows (Shiller and Beltratti, 1992; Campbell and Ammer, 1993), one can argue that it is unsurprising to discover similar findings to those of Machiraju and Rajgopal (2017) and Rajgopal and Tantri (2022). However, it is essential to acknowledge that this correlation is not constant and can be influenced by macroeconomic factors such as business cycles, inflation, monetary policy, and volatility (Gulko (2002)). Therefore, analyzing the yield spread is employed to obtain an independent perspective on the bond market while mitigating the influence of the stock market.

There are several reasons to believe why mandatory CSR activities and their disclosure

may not benefit, and might even harm, debtholders. Once CSR spending and its reporting become mandatory, the government could start prescribing how the CSR money should be spent, thereby limiting a firm's flexibility in coming up with its CSR policies. Moreover, various interest groups may find it easier to lobby management to advance their environmental and social goals. Finally, mandatory CSR also comes with compliance obligations such as administrative costs associated with reporting information and the need for the board to monitor the firm's CSR activities. Finally, as discussed earlier, firms could use CSR activities to signal their commitment toward their implicit contracts. Mandatory CSR requires a firm to make its CSR policies more formalized and visible, which, in turn, could strengthen such a commitment. Hence, the terms of the firms' explicit contracts could become more favorable to the firm. There are several ways in which CSR can either have a positive or negative impact on debt valuation. Based on this discussion, I propose the first hypothesis:

H1: Debt markets price the mandatory CSR.

In their survey, Shleifer and Vishny (1997) broadly define corporate governance as "the ways through which suppliers of capital to corporations assure themselves of getting a return on their investment." Corporate governance is important for the bondholders to mitigate – agency risk and information risk. If corporate social responsibility (CSR) arises from agency risks, an enhancement in governance mechanisms could enhance the firm's ratings and decrease the yield. Similarly, information risk, which refers to managers withholding private information that could negatively impact default risk, could be mitigated as governance mechanisms can prompt firms to disclose information promptly. This implies that governance mechanisms can indirectly impact bond ratings and yields by reducing information risk (Bhojraj and Sengupta, 2003). Taking this into account, I posit a second hypothesis.

H2: Corporate governance affects the debt markets' pricing of mandatory CSR.

Not only do firm and bond characteristics and corporate governance mechanisms affect the bond yield but also the information asymmetry. Duffie and Lando (2001) proposed that incomplete accounting information contributes to imprecise knowledge of firm value, leading to different predictions for the shape of the yield spread term structure. This suggests that information asymmetry on CSR expenditure is crucial as it could impact the default probabilities. There is no dearth of research which shows investors demand an extra return to induce them to hold assets subject to high information asymmetry.[7] Wittenberg-Moerman investigated the same for the debt market and show that information asymmetry increases the cost of debt capital and decreases debt maturity. If it is true, information on CSR expenditure and NGOs used for disbursement would mitigate the chances of agency issues and would help in better pricing of debt. This provides the third hypothesis,

H3: Information asymmetry on CSR disbursement affects the debt markets' pricing of mandatory CSR.

III. DATA

I obtained information on Indian bond issuances from the SDC Platinum database, which includes 6,607 bond issues between January 1, 2010, and December 31, 2016. I excluded bonds with contingent features as they are rare and can complicate the data. The remaining sample merged with the Center for Monitoring Indian Economy (CMIE) ProwessDx database which provides information on firm characteristics. However, due to missing identifiers for some observations, I had to match datasets using fuzzy matching and manual verification,

[7]See, Diamond and Verrecchia (1991), Easley and O'Hara (2004), Berger et al. (2006), Core et al. (2006), and others for the same.

resulting in a match for 3,737 bond issues. I further eliminated bond issues without offer yield to maturity data, reducing the sample size to 3,281. Furthermore, to ensure balance, I selected a sample of bond issues three years before and three years after the enactment date (i.e., 29th August 2013), and referred to them as the pre-CSR and post-CSR periods, respectively. This step eliminated 868 bond issues, resulting in a final sample of 2,413 bonds issued by 183 firms. The details on the selection criteria can be found in Table I.

III.A. Bond Issuances: Affected versus Unaffected Firms

The distribution of bond issues each year is shown in Panel A of Table II. There is no clear pattern in the number of bond issues. On August 29th 2013, the Indian president signed a bill into law after the mandatory CSR rule was approved by both houses of parliament - Lok Sabha (lower house) and Rajya Sabha (Upper House).[8] Therefore, to analyze the impact of the CSR Mandate, I define two periods: the pre-CSR period from August 30th, 2010 to August 28th, 2013, and the post-CSR period from August 29th, 2013 to August 30th, 2016. During the pre-CSR period, 1,434 bonds were issued, while 979 bonds were issued during the post-CSR period.

To be subjected to CSR mandates, firms must meet one of the following criteria: (1) a net worth of at least 83 million USD (approximately 5 billion INR), (2) sales of at least 167 million USD (approximately 10 billion INR), or (3) a net profit of at least 0.83 million USD (approximately 50 million INR). By knowing whether the firm crossed these thresholds, I created three variables ($R1$, $R2$, and $R3$) based on the profit, net worth, and sales thresholds, respectively. These variables are expressed as percentage differences from the cutoff threshold.

(1)

[8]Further institutional details are illustrated in Figure I.

$$R1 = (PRETAXINCOME - 0.83)/0.83$$
$$R2 = (NETWORTH - 83)/83$$
$$R3 = (TOTALREVENUE - 167)/167$$

All values are in USD.

In order to meet all three criteria with one measure, I develop a construct called M. This measure takes on the lowest positive value of $R1$, $R2$, or $R3$ if at least one of these variables is positive. If all three variables are negative, the measure takes on the highest value. The computation of measure M is as follows:

(2)

$$\text{M=} \begin{cases} min(R1, R2, R3) & if R1 \geq 0, R2 \geq 0, and R3 \geq 0 \\ min(R1, R2) & if R1 \geq 0, R2 \geq 0, and R3 < 0 \\ min(R2, R3) & if R1 < 0, R2 \geq 0, and R3 \geq 0 \\ min(R1, R3) & if R1 \geq 0, R2 < 0, and R3 \geq 0 \\ max(R1, R2, R3) & if R1 < 0, R2 < 0, and R3 < 0) \end{cases}$$

Determining the value of M is a non-linear process. I must find the minimum positive value if at least one of the three variables is positive, and the maximum negative value if all three variables are negative. The algorithm chooses the minimum positive value if any of the three metrics are positive. If all three measures are negative, it switches to the maximum negative value. Based on these metrics, I have developed four variables to identify the firms impacted by the CSR rule.

(3)

$$\text{Affected} = 1 \text{ if } M > 0, \text{ otherwise } 0$$

$$\text{Affected_R1} = 1 \text{ if } R1 > 0, \text{ otherwise } 0$$

$$\text{Affected_R2} = 1 \text{ if } R2 > 0, \text{ otherwise } 0$$

$$\text{Affected_R3} = 1 \text{ if } R3 > 0, \text{ otherwise } 0$$

M and *Affected* are the primary measures I use to reflect the requirements of the Act 2013. For robustness, I run my empirical tests using the component-specific criteria- $R1$, $R2$, and $R3$, as well. Difference-in-differences and RDD tests require that the post-CSR treatment effects are truly exogenous. While managers have discretion regarding reported income, they are unlikely able to simultaneously manipulate the total revenue of the firm, its net worth and its total profit.

Table II, Panel A, shows data on the total amount of capital raised by bond issuers. The average bond issue by affected firms in 2010 was USD 96 million and peaked at USD 98.595 million in 2014 before falling to USD 77.776 million by 2016. For the unaffected firms, the value of bonds issued increased from USD 2.097 million in 2011 to USD 84.247 million in 2016. Surprisingly, the average size of a bond issued by unaffected firms in 2015 and 2016 is greater than that of affected firms. This shows how the mandatory CSR rule impacted the amount issued for affected firms compare to others.

Table II, Panel B, shows the distribution of bonds issued by affected/unaffected firms based on the criteria described above. There are 2,352 bonds issued by affected firms and 61 bonds issued by firms not affected by the mandatory CSR spending requirement. Net profit and net worth criteria are the primary criteria for determining whether a firm is subject to mandatory CSR spending.

III.B. Information Retrieved from CSR Reports using Open-source Large Language Model (LLM)

Large Language Models (LLMs) represent a significant advancement in artificial intelligence, capable of processing and generating text with a high degree of coherence and adapt-

ability across multiple tasks. These models are a form of machine learning that specialize in understanding and generating human language, developed through training on extensive datasets. They utilize deep learning algorithms to grasp the intricacies and patterns of language, enabling them to respond to a wide array of queries and prompts with human-like accuracy.

In this paper, I harness the power of LLMs to gather information on CSR governance, including specifics about CSR committees, the details of CSR activities, their implementation, and adherence to CSR rules. To this end, I have developed an app based on an open-source LLM model. Prior to extracting data from CSR reports, I fine-tune the app using five reports, focusing the model on prompts related to essential information such as firm name, report year, expenditure on CSR activities, unspent amounts, details of these activities, and reasons for any non-expenditure.

The effectiveness of app is evidenced in Appendix C1, which displays its proof-of-work. For example, when I upload the CSR report of a Asian Hotels (West) Limited for 2015-16 and input relevant prompts, app accurately furnishes all requested information, verified through manual cross-checking with the original report. Appendix C2 provides a glimpse into the raw data for five firms, collated efficiently using app. This demonstrates the app's capability to streamline data collection and analysis in the realm of CSR governance, offering a powerful tool for extracting nuanced insights from complex reports.

The initial phase of the process involves gathering all CSR reports and converting them into plain text. To facilitate efficient processing by the large language model (LLM), this text is first segmented into chunks and subsequently broken down into tokens. The size of these tokens is limited to the maximum number of tokens the LLM can process at one time, ensuring efficient operation.

In the next step, using the word embeddings of an open-source LLM model, these tokens are transformed into vectors and stored in a vector database. Once this database is estab-

lished, a query or prompt is inputted into the LLM. To retrieve relevant pages for the model, an embedding for the query is generated. This embedding is then utilized to locate similar pages within the vector database, based on their vector similarities.

An essential architecture underpinning LLMs is the transformer model. This neural network model excels in understanding context and meaning by analyzing relationships in sequential data, such as words in text. Transformers employ a set of mathematical techniques known as attention or self-attention. These techniques enable the model to detect and interpret the complex interdependencies between distant elements in a data series. The transformer model updates the hidden state for each word in the input text through a two-step process: an attention step and a feed-forward step. In the attention step, words exchange relevant contextual information with each other. In the feed-forward step, each word contemplates the information acquired in the attention step to predict subsequent words.

The various components of the transformer, which are instrumental in enabling it to respond to queries, are detailed in Appendix D. This structure facilitates the model's ability to comprehend and process large volumes of text, making it a powerful tool for analyzing CSR reports and extracting meaningful insights.

The development of 'ESG app' plays a pivotal role in constructing a database from CSR reports of firms affected by the CSR rule from 2014-2016.[9] This CSR governance database is then contemporaneously matched with the debt data of the affected firms.

Among the 932 bonds issued during this period, I successfully align 247 bonds with their corresponding information in the CSR governance database. This matching process is key to analyzing the relationship between the firms' financial decisions and their CSR commitments. It highlights the utility of 'ESG app' in seamlessly integrating CSR reporting

[9]This period is selected because firms impacted by the CSR rule start to provide detailed information on their CSR activities, committees, and expenditures following the rule's implementation.

with financial data, offering a novel perspective on the effects of CSR governance on debt market behaviors.

III.C. Descriptive Statistics

The dependent variables for this study are $Yield$ (measured as the offer yield to maturity), *Yield Spread* (measured as the offer yield to maturity minus a reference Treasury bill rate), and the *Amount Issued* (measured as the principal amount issued, scaled by sale). The maturity of reference Treasury bills is based on the frequency of bonds in the sample and their maturity:

(4)

$$\text{Maturity}_{(Ref,Tbill)} = \frac{1}{N}\sum(N_i \text{x} Maturity_i)$$

$Maturity_{(Ref,Tbill)}$ for the sample is four years, and therefore, the reference treasury bill rate is the interest rate of the treasury bill with four years of maturity. The four year t-bill rate didn't change much during the sample period, it is average 8.22 % in pre-CSR rule period and 7.76% in post-CSR period. The difference is statistically insignificant.

Table III presents the summary statistics for the variables used in the analysis. The mean (median) *Yield* is 9.558% (9.550%). The mean (median) *Yield Spread* is 1.876% (1.464%). These data suggest the cost of capital for firms in India is relatively high, but most of it is due to the base level of interest rates in the economy rather than the high credit spreads of bond issuers. The control variables used are *Size, Leverage, Tobin's Q, Credit Rank,* and *Maturity. Firm Size, Leverage,* and *Tobin's Q* are calculated as the log of total assets, the ratio of long-term debt to total assets, and the ratio of the market value of equity plus the value of long-term debt to the book value of assets, respectively, and are for the lagged fiscal year. All three variables were winsorized at the 1% level. The mean

(median) *Tobin's Q* level is 2.218 (1.938), indicating that bond issuers have strong growth potential. *Credit Rank* is a rank for the securities rating grades assigned based on ratings given by different agencies. Three rating agencies (CARE, ICRA, and CRISIL) dominate the market and rate various corporate securities. ProwessDx provides a composite rating grade that considers ratings from all three rating agencies and ranks the bond in terms of safety in eight categories: highest safety, high safety, moderate safety, adequate safety, inadequate safety, substantial risk, high risk, and default. I convert these rating grades into ranks from 8 (highest safety) to 2 (high risk) and develop a *Credit Rank* measure. As seen in Table III, the mean (median) credit rank is 7.465% (7.5%), with a standard deviation of 0.648%. Bond maturity (Maturity) is calculated as the difference between the issued year and the maturity year. The mean (median) *Maturity* is 6.598 (3.000) years, suggesting that Indian firms largely issue short-term bonds, with some firms issuing longer-term bonds.

I also create two measures to determine whether an issuer is a good CSR citizen, using data from NSE Infobase on the actual spending and the identification of the agency through which such funding is implemented. Table B1, Panel A (see Appendix B), shows an example of the CSR spending data for the top 10 firms with the highest CSR spending. These firms, such as Reliance Industries Ltd., NTPC Ltd., and Power Finance Corp. Ltd., each spend between $1.714-8.006 million on CSR activities. Table B1, Panel B (see Appendix B), lists the names of the agencies that the top 10 CSR spenders used for disbursing their CSR expenditures. Some firms (e.g., Reliance Industries) use an affiliated NGO entity (i.e., an in-house NGO). Other firms, such as HDFC, use external NGO firms.

Based on the amount of CSR spending and the channel used for this spending, I create two proxies for a firm being a good CSR citizen. *Amount Spent* captures the absolute deviation of actual CSR expenditure from the expected value, measured in percentage. As Table 3, Panel C, shows, the mean (median) ratio of the deviation to the expected CSR spending is about 67% (100%). This clearly implies that the majority of the firms spend less

than the expected CSR expenditure required by law. NSE Infobase also discloses the details of agencies (NGOs) that affected firms use to channel their CSR efforts during the post-CSR period. I generate an indicator variable (*NGO Indicator*) using the same that takes a value of 1 if an issuer maintains transparency and provides agency names; otherwise 0.

Utilizing the CSR governance data collated by 'ESG app', I employ the number of CSR committee members as an indicator of CSR governance. This dataset also sheds light on the reasons companies cite for not spending the prescribed CSR amount. A common justification among firms is the challenge in identifying suitable CSR activities or implementing agencies, leading to underinvestment in prescribed areas. Another frequent approach is cautious investment: firms often initiate pilot projects to 'test the waters' and, based on their success, decide on further investments in CSR.

Other prevalent reasons include issues related to law and order, capital constraints or due to business expansions. To provide a clearer understanding of these factors, Table C3 in the appendix presents selected excerpts from CSR reports, categorizing the various reasons that companies give for their spending decisions or lack thereof. This detailed analysis not only offers insights into the dynamics of CSR expenditure but also underscores the complexities businesses face in aligning their CSR activities with regulatory requirements and operational realities.

IV. RESEARCH DESIGN

To examine the effect of post-CSR on a firm's cost of debt, I compare the yield to maturity of affected firms to those of unaffected firms in the pre-CSR and post-CSR periods. I use two comparison approaches: a difference-in-differences approach and an MRDD.

IV.A. Difference-in-Differences Design

I evaluate the debt market reaction to the CSR rule by examining the changes in the yield and yield spread before and after the CSR rule came into effect. Yield and yield spread can change for unobservable reasons that affect firms that are subject to the CSR mandate and firms that are not. Therefore, I use a difference-in-differences approach to understand the relative yield changes for the two samples of firms using the following regression specification:

(5)

$$\mathrm{Y} = \alpha + \beta_1 Affected + \beta_2 CSRRule + \beta_3 AffectedXCSRRule + \gamma X + \delta_{Industry} + \epsilon$$

Here, Y is Yield, Yield Spread, and Amount Issued (scaled by sale). The coefficient of interest is β_3, the coefficient on the interaction term $AffectedXCSRRule$ that captures the impact of the exogenous imposition of a minimum level of CSR expenditure. X represents the set of firm- and bond-level controls in the regression; $\delta_{Industry}$ is industry fixed effects. For robustness, I also use component-specific measures ($Affected_R1, Affected_R2$, and $Affected_R3$) and the respective interaction variables to capture their interaction with the CSR rule.

IV.B. Multi-Dimensional Regression Discontinuity Design

I also use an RDD to document the effect of the CSR rule on yield-spreads. The RDD technique has been used in prior research—for example, Flammer (2015), Manchiraju and Rajgopal (2017) and Iliev (2010)—for resolving endogeneity concerns. For RDD to work, it is important that the critical value that causes a discontinuity is truly exogenous and cannot be manipulated. As the CSR mandate involves three separate thresholds, it is difficult for firms to manipulate all three to determine whether they fall under the minimum CSR spending requirement. The inferences drawn under an RDD approach are considered to be

credible because the assignment of individuals in treatment and control groups is "as good as randomized," given that individuals cannot precisely control the assignment variable near the exogenously determined cutoffs (Lee and Lemieux, 2010). My research setting differs from the basic RDD applications listed above in that the mandatory post-CSR relies on more than one rating score to determine treatment status. Therefore, I implement multi-dimensional RDD (MRDD). To estimate the treatment effects under MRDD, I follow the method of Reardon and Robinson (2012). Their methodology is simple, easy to use and re-frames the multi-dimensional vector of rating scores into a single dimension for determining treatment status; hence, it ensures minimal loss of data in estimations. I fit the following model using zero as the critical value of the binding score.

(6)

$$\mathrm{Y} = \alpha + F(M) + \gamma X + \epsilon$$

Here, Y is Yield or Yield Spread. In the RD setting, there are two underlying relationships between Y and X, represented by $E[Y(M > 0)|X]$ and $E[Y(M < 0)|X]$. However, by definition of the RD design, all individuals to the right of the cutoff (M=0) are exposed to treatment and all those to the left are denied treatment. Therefore, I only observed $E[Y(M > 0)|X]$ to the right of the cutoff and $E[Y(M < 0)|X]$ to the left of the cutoff. I am interested in a discontinuity at cut-off, which can be computed as follows:

(7)

$$\text{Discontinuity at cut-off} \begin{cases} = \lim_{\epsilon->0}(E[Y|X, M = 0 + \epsilon) - \lim_{\epsilon->0}(E[Y|X, M = 0 - \epsilon) \\ = E[Y(M > 0)Y(M < 0)|X, M = 0] \end{cases}$$

This is the average treatment effect at the cutoff ($M = 0$), and h is the length of the bandwidth. The selection of the bandwidth h creates a trade-off between bias and precision. A wider bandwidth allows more data points to be included farther away from the cut-off (e.g., Imbens and Lemieux, 2008; Lee and Lemieux, 2010). Thus, for fitting a high-order polynomial, more data points may help capture non-linearities in the data more precisely in a flexible way. However, as I include more data away from the cut-off, I run the risk of including the effects of other events taking place away from the cut-off. To maintain the balance between precision and bias, I study discontinuity by running a quadratic polynomial regression that fits, in narrow bands ($h = 10$) around the cut-off, one polynomial each on the left and the right of the cut-off, which in my case is M (= 0). I use the overall criteria M as the binding score in my regressions. I also use the individual components R1, R2, and R3 as alternate metrics for robustness. Firms to the right of the cut-off score of 0 are affected by the mandatory CSR rule, whereas firms to the left of 0 are unaffected. Discontinuity in yield spread at the cutoff captures the impact of the exogenously imposed mandate for minimum CSR spending.

V.EMPIRICAL RESULTS

In this section, I discuss the impact of mandatory CSR on bond characteristics such as yield and yield spread and the channel through which it happens. Next, I confirm these results using multi-dimension RDD.

V.A. Yield

Figure II illustrates the shifts in yield and yield spread for affected and unaffected firms during the pre-rule to post-rule period. The results indicate that unaffected firms experience a decrease of 1.56% in yield and 1.08% in yield spread. In contrast, affected firms observe a reduction of only 80 and 65 basis points, respectively. This suggests that the mandatory

CSR expenditure requirement absorbs 43 basis points of the yield spread for the affected firms.

Table IV shows the results for difference-in-differences regressions for the offering yield on the bonds in my sample. Eight models are presented. Panel A presents the results when controlling only for the post-CSR period and the interaction term between whether firms are affected and the post-CSR period. Column (1) uses the overall metric Affected, which uses the three criteria depending on net worth, profit, and sales, for determining whether the firm is affected by CSR rule. Columns (2)-(4) present the case when the individual measures alone are used to determine whether firms are affected by the post-CSR period. In these regressions, I replace the variable Affected with $Affected_R1$, $Affected_R2$, and $Affected_R3$. CSR Rule is equal to 1 for the post-CSR period and is equal to 0 in the pre-CSR period. All the regressions are run with industry-fixed effects based on the Fama-French 49 industry classifications. Panel B augments the regressions in Panel A by including control variables. As in Panel A, Column (1) uses the overall metric Affected and in Columns (2)-(4), I replace *Affected* with the component metrics $Affected_R1$, $Affected_R2$, and $Affected_R3$. Again, all the regressions are run with industry-fixed effects based on the Fama-French 49 industry classification.[10]

I find that the coefficient on $CSRRule$ was negative in all models. This suggests that yield is somewhat lower for bonds issued after 29th Aug 2013 (post-CSR rule). The coefficients of the $Affected$ measures are mostly negative, except for in Model 4 in Column A, where the sign on $Affected_R3$ is positive and significant. Unsurprisingly, firms affected by the CSR mandate have a lower yield than unaffected firms, as affected firms are likely to be large and profitable and, therefore, have lower yields. These findings are consistent with the observations in Figure II, indicating that in the absence of the mandatory CSR rule, both yield and yield spread would have decreased for all firms, with a greater impact on affected

[10]Complete tables showing the coefficients of all control variables are provided in Online Appendix D.

firms given their larger size and profitability. However, implementing the CSR mandate offset these advantages for the affected firms.

Results also suggest that bond and firm characteristics only partially explain the yield variation. The interaction variables between $Affected$ and $CSRRule$, the variable of interest that captures the impact of exogenously imposed CSR activity, are positive and statistically significant in all eight models. Thus, the impact of the $CSRRule$ is robust when using the overall measure M or the individual components *R1, R2,* or *R3*, in determining whether firms are affected by *CSR Rule*, both with and without controls. The magnitude of the coefficient varies and reflects the variations in the sample of firms that would be affected by *CSR Rule* using these alternate specifications. Using the criteria for mandatory CSR as specified by the Act 2013 (i.e., firms are subject to mandatory CSR if at least one of the measures is positive), I find that *Yield* increases for firms affected by *CSR Rule*. This result is consistent with the notion that mandating CSR expenditures reduces future cash flows and increases the perceived costs of financial distress.

The table also shows the sign and significance of the control variables. Bonds issued by larger firms have lower credit spreads, as large firms are likely to have large future cash flows and sufficient assets that can serve as collateral. Interestingly, bonds issued by firms that have higher leverage have lower spreads. This is perhaps because firms with higher leverage have greater debt capacity. The coefficient on Credit Rank is negative and significant. As expected, higher-rated firms have lower spreads.

V.B. Yield Spread

Another variable of interest is *Yield Spread*, defined as the difference between the offer yield to maturity (*Yield*) minus a reference Treasury bill. While I controlled for firm characteristics, interest rate variations within the pre- and post-CSR periods may affect the overall offering yield. Table 5 presents the results for the difference-in-differences regressions for

yield spread.

The results for *Yield Spread* largely mimic the results for the offering yield. I find that the coefficients on the interaction variable between CSR Rule and the Affected are positive and significant in all regressions, suggesting that firms affected by the CSR mandate have higher yield spreads in the post-CSR period than in the pre-CSR period.

The economic significance of the *CSR Rule* can be examined by the coefficient on the interaction term (1.030), which is equal to 103 basis points. While there is a general decline after 2013, perhaps reflecting the other requirements of Act 2013, the offsetting effects of mandatory CSR spending increased the cost of capital by 103 basis points. The 103 basis-point increase in yield spread indicates the significant causal economic effect of the mandated CSR. Earlier studies have shown that voluntary CSR can positively affect bond markets, but such studies are subject to endogeneity and reverse causality issues. The empirical design in the current study resolves these econometrics issues and enables an examination of the value impact on the bond markets of CSR spending.

These findings indicate that mandatory CSR has a detrimental effect on the bond market. The mandate for CSR spending targets large and profitable firms, but the lack of flexibility reduces the cash flows available to firms to meet their debt obligations. Such a lack of flexibility harms the market's perceptions of bond value, leading to a higher cost of capital for firms. Mandatory CSR also exacerbates the moral hazard between insider managers and shareholders. Firms must pick from an approved list of acceptable CSR activities, which could give private benefits to the insider manager. It is also plausible that all allowed types of CSR activity benefit society without benefiting the firm. As noted by John, Nair and Senbet (2005), socially conscious investments that generate non-monetizeable benefits to society but are negative net present value (NPV) for the firm should be rejected by the firm. If such projects are mandated, shareholders and bondholders can lose value.

V.C. Free Cash Flow, Mandatory CSR, and Bond Yield

To investigate this possible channel by which CSR spending can affect yield spreads, I run a two-stage structural model. The first stage models the impact of the CSR mandate on future cash flows, and the second stage examines the impact of the predicted future free cash flow (FCF) on bond yields and spreads. The future FCF is computed as

(8)

$$\text{FCF}_{t+1} = Log((NOPAT_{t+1} - I_{t+1}))/(AT_{t+1})$$

Here, $NOPAT$ is net operating profits after taxes, I is investment, and AT is total assets. All these measures are at t+1. Table VII shows the results of this test. Column (1) of Panel A shows that the coefficient of the interaction variable, Affected X CSR Rule, is negative and highly significant, implying that the cash flows for affected firms decrease significantly relative to unaffected firms in the post-CSR rule period when compared to the pre-CSR rule period. Column (2) shows that the coefficient of FCF_{t+1}(fitted value) is also negative and highly significant, implying that the increased capital expenditure due to the CSR rule has a negative impact on cash flow, which, in turn, leads to an increase in yield spreads. Therefore, I conclude that even if CSR expenditure is part of profits, the negative impact on cash flows leads to higher credit spread.

V.D. Regression Discontinuity Analysis

I next examine the importance of the mandatory CSR rule by using a regression discontinuity framework. Given that there is an exogenously imposed criteria for mandating a minimum CSR expenditure in the post-CSR period, I expect to see a discontinuity around the scale measures centered on zero. That is indeed what I find. Table VI and Figure III present the results and plots for the binding score MRDD. As Table VI shows, the coefficient

on the RDD variable, post-CSR, is positive and highly statistically significant. Figure III shows the RDD plots. As Panel A of the figure shows, there is a discontinuity at $M = 0$ in the overall sample. Yield spreads for bonds issued by firms that just meet the CSR criteria are higher than the yield spreads for firms that just missed the criteria. Panel B and Panel C show similar RDD plots for bond issues in the pre-CSR period and post-CSR period, respectively. As shown in these panels, the increased spreads and discontinuity at M=0 only exist in the post-CSR period. Thus, the RDD test also confirm that yield spreads increased after the CSR rule was implemented.

VI.ADDITIONAL TESTS

This section explores how affected companies respond to the penalization imposed by the debt market. It investigates the influence of mandatory CSR on the yield spread, considering factors such as ownership structure and corporate governance, repeat issuances, stock volatility, and implications for firms that voluntarily engaged in CSR before the rule's implementation. Furthermore, robustness tests, including balanced sample analysis and placebo tests, are conducted to validate the main findings.

VI.A. Supply Side Impact: Impact of Mandatory CSR on the Amount Issued

In sections V.A and V.B, the demand side outcomes are presented, specifically focusing on how debtholders assess the value of mandatory CSR. However, it is also important to consider the possibility of supply-side changes. To explore this aspect, I examine how both affected and unaffected firms adjusted their debt-raising behavior in response to the CSR rule. The findings of this analysis can be observed in Table 6, where the dependent variable is the scaled issue amount. Column (1) presents the regression results for the issued amount using "Affected" as the metric to indicate firms subject to the CSR rule. The coefficient of "Affected X CSR Rule" is -0.144, with marginal significance at 10%. This indicates that,

compared to unaffected firms, those affected by the CSR rule reduced their debt issuance by 14.4%. Columns (2)-(4) demonstrate the outcomes for firms impacted by sales, net worth, or profits, using "$Affected_R1$", "$Affected_R2$", and "$Affected_R3$" respectively. The control variables exhibit expected results that align with previous studies. These findings suggest that despite the penalization imposed by the debt market through increased yield spread, the affected firms anticipated this outcome and consequently decreased their debt-raising activities.

VI.B. Balanced Sample: Nearest Neighbor Matching

To ensure accuracy, I conducted a robustness check by analyzing a balanced sample. This is important because an uneven distribution of affected and unaffected bonds could potentially impact the results. To achieve balance, I utilized the nearest neighbor matching algorithm, as recommended by Larcker and Watts (2019), Flammer (2021), and others. In Table 9, I present the findings for the balanced sample. Panel A displays the distribution of affected and unaffected bonds during the pre- and post-rule periods. Specifically, there were 28 affected bonds and seven unaffected bonds in the pre-CSR rule sample. In the post-CSR rule sample, there were 58 affected bonds and 21 unaffected bonds.

In Panel B, a comparison is made between the characteristics of affected and unaffected bonds in a balanced sample. The t-statistics show that the sample is balanced in terms of Tobin's Q, Maturity, and Credit Rank. Moving on to Panel C, the difference-in-differences results for the balanced sample are presented, showing that the coefficient of $AffectedXCSRRule$ for $Yield$ and $YieldSpread$ are 2.404 and 1.277 respectively. Both coefficients are significant at 5%. These findings confirm that debt holders demand higher yields from affected firms than from unaffected firms. Additionally, I analyzed the amount of debt issued by affected versus unaffected firms and discovered that the amount of debt issued by affected firms decreased due to the CSR rule, although the coefficient is insignificant.

VI.C. CSR Spending Channel

I have noticed that there is a variance in the yield spread of companies affected by the CSR rule, and I believe this is due to a lack of transparency when it comes to CSR spending. To investigate this further, I collected data from the NSE Infobase on CSR expenditure. The data provides firm-level information on prescribed CSR spending, the actual amount spent, broad categories of CSR projects, the amount allocated and spent under these broad categories and the geography of the projects. It also has information on granular-level details of CSR projects but does not have information on the amount spent on each project under the broad categories. Using NSE infobase data, I found that 80-90% affected firms spent less than the prescribed by the CSR rule, and 40-50% CSR projects and 60-65% CSR expenditure is on poverty, health care, education, and rural development. The same is true for debt-issuing-affected firms as well. Using the details on CSR expenditure, I test the conjecture of whether reducing information asymmetry on CSR expenditure disbursement is rewarded by the debt market.

To test the hypothesis, I calculated two variables: the $NGOIndicator$ and $AmountSpent$. The $NGOIndicator$ is a dummy variable that takes a value of 1 if a company provides information on the agency used to disburse CSR expenditure and a value of 0 otherwise. The $AmountSpent$ is the difference between the expected amount of spending and the actual amount spent, scaled by the expected amount. Columns (1)-(3) of Table X show the impact of disclosing information about NGOs on $Yield$, $YieldSpread$, and $AmountIssued$. The negative and significant coefficient of $NGOIndicatorXAffected$ suggests that a company can receive a rebate in the debt market if it provides information about the NGOs used to distribute CSR expenses. This indicates that the debt market is concerned about the potential loss of cash flow due to CSR and how it will be utilized, given that affected firms are obligated to allocate a minimum of 2% towards CSR expenditure.

The regression results for "Amount Spent" are displayed in columns (4)-(6). It is clear from the findings that companies not meeting the expected CSR expenditure are penalized severely by the debt market compared to other companies. This indicates that the capital market expects firms affected by the CSR rule to act as responsible CSR citizens. This demonstrates the debt market's monitoring function concerning affected firms, ensuring the appropriate utilization of CSR expenses.

VI.D. Shifting the CSR Rule to Commencement Date: Placebo Test

The choice of the enactment or commencement date could potentially impact the outcomes. However, I assure you that the findings remain consistent regardless of the selected date. The results of this test are presented in Table XI. In Column (2), the coefficient of $CSRRule(Comm.)\,X\,Affected$ is 1.402, signifying statistical significance at a 5% level. This indicates that there is a 1.4% increase in the yield spread for bonds of affected firms compared to unaffected ones. The same pattern is observed in Column (1) for $Yield$ and Column (3) for the $AmountIssued$.

VI.E. Ownership Structure

To examine the influence of ownership structure on relation between mandatory CSR and yield spread, three measures are employed. Firstly, a dummy variable ($Conc_Hldg$) is defined as 1 if the shareholding of the firm's promoters exceeds the median promoter holdings in the sample, and 0 otherwise. Secondly, another dummy variable ($Govt_Owned$) is constructed as 1 if either the central Indian government or individual state governments possess an equity stake in the firm, and 0 otherwise. Lastly, a third dummy variable (BG) is developed as 1 if the firm is affiliated with a business group.

I run two sets of models. In the first set of tests, I use all data and examine the coefficient on triple interaction terms between Affected, CSR Rule, and Conc Hldg/Govt Owned/BG.

In my second set of models, I use only bonds issued by affected firms and examine the interaction terms between Affected and Govt Owned/BG. Table XII presents the results of these tests. Columns (1)-(3) present the models for the concentration holding variable ($Conc_Hldg$), Columns 4-6 present the results for the government-owned variable (Govt-Owned), and Columns 7-9 present the results for the business group affiliates (BG). As before, I use several control variables and industry-fixed effects. I find that the coefficient in the triple interaction terms differs for the different ownership measures. For Yield Spread, the coefficient on the triple interaction term is positive and significant for high concentration holding (Conc_Hldg) and government ownership ($Govt_Owned$), suggesting that such firms are not efficient in strategically using their mandatory CSR spending. The coefficient on the triple interaction term with BG is negative and significant. Firms belonging to business groups can coordinate their CSR spending with other firms in the group, thus maximizing their potential benefits. Group affiliation also increases the resources and expertise to manage the CSR spending of the firm better. The table also shows the coefficients on the dummies $Conc_Hldg/Govt_Owned/BG$ and the coefficients on the interaction term between $CSRRule$ and $Affected$. The latter coefficient is in line with the main results of the paper.

The coefficients on the interaction term $AffectedXCSR$ Rule in Models 1-3 capture the impact of the CSR rule on affected firms compared to unaffected firms as before. The coefficients on the treatment dummy (Affected) and treatment period (CSR Rule) range from 0.959-1.290%, indicating a significant increase in the yield-spreads of firms affected by the CSR rule. Models 4-6 only consider affected firms; therefore, the coefficient of CSR Rule captures both the trend in the interest rates and the impact of the CSR rule. The coefficient on CSR Rule in Models 4-6 and the sum of the coefficients on CSR Rule and the interaction term $AffectedXCSR$ Rule in Models 1-3 are similar in magnitude. Models 4-6 results also indicate that firms affected by the CSR rule experience increased yield spreads. The results for the other control variables are similar to my base case results.

VI.F. Corporate Governance

I next analyze the influence of corporate governance on the relationship between the CSR rule and yield spreads. It is anticipated that firms with strong corporate governance will be better positioned to strategically leverage the visibility and impact of CSR expenditures, including those mandated by regulations. Therefore, I expect well-governed firms to mitigate mandatory CSR's overall negative impact. To examine this hypothesis, I consider two measures of good corporate governance. The first measure relates to the degree of board independence. A board composed largely of independent directors is considered an indicator of good corporate governance. Therefore, I create a dummy variable (BI) equal to 1 if the independent board fraction exceeds the median for the sample; otherwise, 0. Next, I examine the impact of the quality of the firm's auditors. I develop another dummy variable ($BIG4$) that is equal to 1 if the auditing firm is an affiliate of multinational auditing firms Deloitte Touche, PWC, E Y or KPMG; otherwise 0. As foreign auditing firms are not allowed to conduct business in India due to the norms of the 1949 Chartered Accountants Act; these auditing firms present in the country through affiliates. I determine the affiliations based on disclosure on auditing company websites. $BIG4$ is 1 for bonds issued by firms audited by the following accounting companies; otherwise, 0:

$$\text{Affiliates of Deloitte \& Touche: } \begin{cases} C.C.ChokshiCo., S.B.BillimoriaCo, A.F.FergusonCo \\ FraserRoss, MCACo \\ P.C.Hansotia \\ DeloitteHaskinsSells. \end{cases}$$

Affiliates of KPMG: $\begin{cases} BharatS.RautCo. \\ SRBCCO. \\ SRBASSOCIATES \end{cases}$

Affiliates of PWC: $\begin{cases} PriceWaterhouseCo. \\ LovelockLewes \\ DalalShah. \end{cases}$

Affiliates of Ernst & Young: $\begin{cases} S.R.BatliboiCo \\ S.R.BatliboiAssociates \end{cases}$

Table XIII presents the results of these tests. Columns (1) and (2) present models that use the entire sample of bond issues, and Columns (3) and (4) present models that only examine bonds sold by affected firms. Columns (1) and (3) use BI as the proxy for good governance, and Columns (2) and (4) use BIG4 as the proxy for good governance. All regressions are run with control variables and industry-fixed effects. The table shows that the coefficient in the triple interaction term between Affected, CSR Rule and BI/BIG4 is -0.785%/-0.456%, which is statistically significant. Similarly, the coefficients on CSR Rule and BI/BIG4 in Models 4-6 are -0.769%/-0.458%, which are also statistically significant. These results are consistent with the hypothesis that good governance ameliorates the negative impact of mandated CSR expenditure. As in Table V, the coefficient on the interaction term $AffectedXCSRRule$ captures the impact of the CSR rule on affected firms. The coefficient is positive and statistically significant, consistent with my base case results. The sum of the coefficients on CSR Rule and the interaction term $AffectedXCSRRule$ in Columns (1) and (2) is similar in magnitude and significance to the coefficient on CSR Rule in Models 3 and 4, confirming the increase in yield spreads in regressions using only affected firms. The

results for the other control variables are similar to my base case results.

VI.G. How Mandatory CSR Affects Repeat Debt Issuances?

In contrast to the equity market, repeat issuances in the debt market are common. This allows examining how mandatory CSR rules affect companies with repeat issuances. Based on FIGURE III, the coefficient for the interaction term ($AffectedXCSRRule$) increases with each repeat issuance. This indicates that if a firm is affected by the rule again and issues debt, the debt market requires a higher yield due to further hit on future cash flows. The data shows that yield increases to 1.535% for second-time repeat issuances and 2.031% for third-time repeat issuances. These results are compared to unaffected companies' debt.

VI.H. Mandatory CSR, Debt Market, and Stock Volatility

One can argue that these results are similar to Machiraju and Rajgopal (2017) and it is expected because of the positive correlation between stock and bond returns. Nevertheless, the correlation does not always remain positive and changes with macroeconomic conditions. Campbell and Taksler (2003) discuss why the prices of corporate bonds might diverge from the prices of corporate equities. First, pessimistic (or optimistic) expectations of future corporate profits affect stock markets differently than debt markets. In mandatory CSR case, loss in future corporate profits due to CSR expenditure would hurt stock market strongly than the debt market. Second, there might be a composition effect if corporate bonds are issued by different companies than those covered in Machiraju and Rajgopal (2017). Third, volatility has opposite effects on stock and bond prices. Given expected profits, volatility of firm value hurts bondholders, because it increases the probability of default; it has a corresponding positive effect for equity holders. Thus, volatility should drive up the yields on both new and seasoned corporate bonds. Campbell and Taksler (2003) measure the causes of variation across companies and, over time, in corporate bond yield spreads. They find

that the volatility affects the yield spread, controlling for composition effects, the demand for the liquidity provided by Treasury bonds, and special features of corporate bonds.

As stock volatility is crucial in linking stock returns to the bond yield. I show the results controlling for stock volatility. Results are provided in Table B3. The coefficient of 'Affected x CSR Rule' for yield and yield spread are the same in sign and magnitude suggesting that the results are not driven by stock market changes. Similarly, in response, affected firms reduce the amount issued. This result is also robust to stock volatility.

VI.I. Voluntary CSR and Debt Market

Past research shows that voluntary CSR reduces the cost of debt (Goss and Gordon 2011; Flammer 2021). As firms were doing CSR even before the rule was enacted, either as philanthropy or as signaling. Dharmpala and Khanna (2018) and Rajgopal and Tantri (2022) show that such firms change their CSR behavior due to the rule. Therefore, there is a possibility that for such firms, the yield and yield spread are affected differently.

To analyze that, I collected information on firms involved in CSR in pre-rule period from Karmayog database. Using fuzzy matching and manual match, I could able to match 74 firms (out of 103) in pre-rule period. Keeping only the bonds of these firms, I find that debt market penalizes such firms but less harshly. Detailed results for this test are provided in Table B4.

VI.J. Mandatory CSR Governance

The CSR rule mandates a 2% CSR expenditure for affected firms, simultaneously necessitating the establishment of CSR governance. As per the mandate, these firms must form a CSR committee tasked with developing a CSR policy, recommending expenditure amounts, and periodically monitoring the policy. Table XIV presents the effects of CSR governance, measured by the number of CSR committee members, on the debt market for the affected

firms. In columns (1) to (4), which focus on yield spread and yield, baseline results indicate that CSR governance is inversely related to both yield spread and yield, reducing them by approximately 10-15 basis points. However, this association diminishes upon the inclusion of firm and bond-level control variables, suggesting that the increase in yield spread is primarily driven by mandatory CSR expenditure.

Further, columns (5) and (6) examine the impact on the amount issued-to-sale ratio. These findings demonstrate that firms with stronger CSR governance experience an increase in their issued-to-sale ratio by 1-1.2%. This underscores the positive influence of effective CSR governance on financial performance, distinct from the costs associated with mandatory CSR expenditure.

(b) recommend the amount of expenditure to be incurred on the activities and

(c) monitor the Corporate Social Responsibility Policy of the company from time to time.

VII. CONCLUSION

This paper sheds light on the discussion around Corporate Social Responsibility (CSR), an area which has caught the interest of policymakers, academics, and corporations themselves. In prior research, the focus has predominantly been on the implications of CSR on corporate finance and asset pricing decisions. However, in most of these studies, CSR activities have been carried out voluntarily, making it challenging to identify the driving motives behind the outcomes. In this study, I have taken a different approach to overcome this constraint by investigating the impact of CSR in the Indian debt markets where CSR spending is a statutory requirement for profitable firms. This unique environment allows for a deeper analysis of how obligatory CSR practices influence the pricing of debt securities.

For the empirics, I utilized bond data from Indian companies, conforming to the 2013 Company Act which made it compulsory for profitable firms, or those with considerable sales or net worth, to dedicate at least 2% of their profits to CSR activities. This setting enabled a

thorough investigation of the direct impact of CSR spending without endogeneity concerns, as this spending is now regulated rather than a strategic decision by management.

To understand how a company's CSR spending influences its bond yields and yield spreads, I utilized a difference-in-differences analysis and multi-dimension regression discontinuity models. The empirical findings indicate that the mandatory CSR rule widens the yield spread by 43 basis points for the affected firms compared to others. When examining the impact of other requirements of the Act alongside the mandatory CSR rule, it appears that while the former contributes to a reduction in the yield spread, the mandatory CSR rule negates these benefits for the affected companies.

After adjusting for bond characteristics, firm traits, and industry-fixed effects using a difference-in-differences specification, the yield spread of bonds issued by the affected firms increased by 103 basis points compared to those issued by unaffected firms. To ensure the accuracy of these findings, I employed a multi-dimension regression discontinuity design (MRDD) to identify the diverse impacts of the rule on firms that barely met the CSR cutoff versus those that narrowly missed it. The results show that both the yield and yield spreads for bonds issued by firms that met the criteria were higher than those that missed the CSR criteria. Mandatory CSR had a considerable and positive impact on yield spreads, implying potential negative effects on bond markets, as it diverts cash flows from future investments and influences future cash flows, particularly for large and profitable companies.

Mandatory CSR can generate a dilemma where managers favor their interests over debtholders. This can be addressed by increased transparency in CSR fund usage. While some CSR activities may not directly boost the company's profits, they can still yield societal benefits. However, such socially responsible investments that aren't financially profitable can also diminish the company's overall value. Sound governance can help balance these effects, as well-managed companies can allocate their CSR funds more effectively.

Furthermore, I delved into how affected firms respond to debt market penalization by

exploring the mechanisms through which mandatory CSR affects yield spread, the role of ownership and governance, the effect on repeat issuances, the effect of stock volatility, and implications for firms that had voluntarily engaged in CSR before the rule, among other robustness tests such as balanced sample and placebo test. The primary result, namely the rise in yield spread, is particularly pronounced for firms with repeated issuances and exhibits a slight decline for companies that maintain transparency regarding their CSR allocations.

To summarize, the findings of this study suggest that mandated corporate social responsibility (CSR) may come with costs for bondholders. However, this perspective focuses solely on the company's standpoint. It is important to acknowledge that CSR initiatives can generate societal benefits that may not directly translate into gains for the company itself. As John, Nair, and Senbet (2005) highlighted, socially responsible investments can yield intangible societal benefits but may have negative net present value for the firm. If mandated CSR leads companies to invest in such projects, society may benefit, while shareholders and bondholders may experience a decrease in value. Further research is necessary to assess CSR's overall impact, considering its benefits to society and providing a comprehensive understanding of its net effects.

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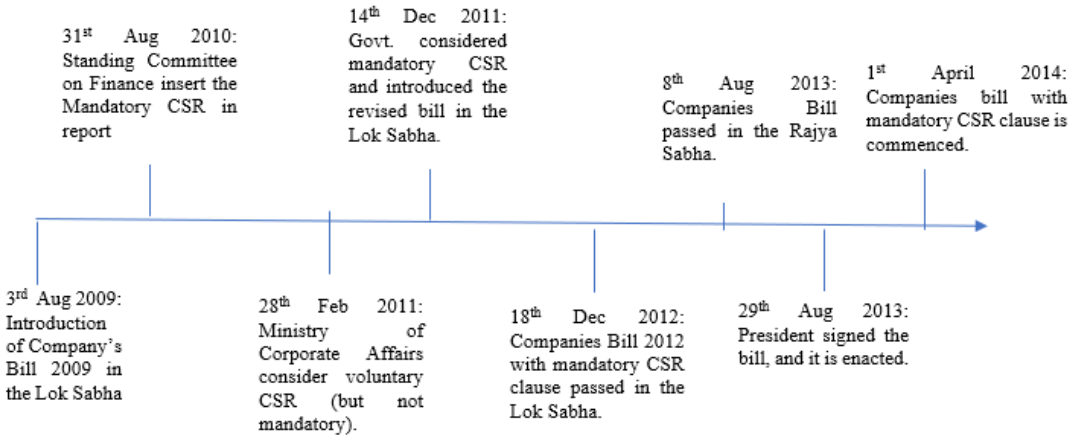
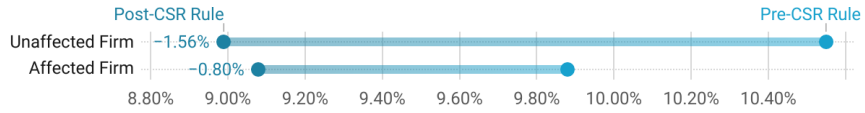


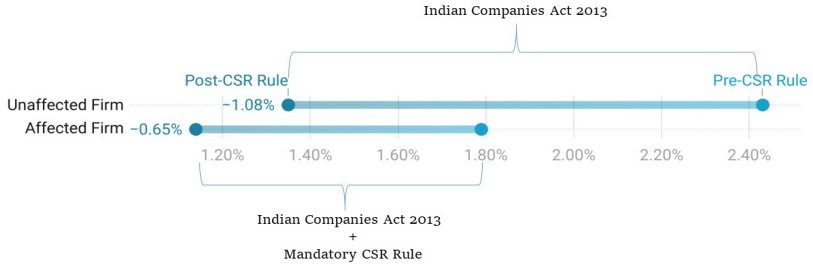
FIGURE I

Timeline of the corporate social responsibility (CSR) rule implementation

*Notes.*This figure describes the events around the adoption of the CSR rule. The rule is discussed in section 135 of the Indian Companies Act 2013.



Panel A: Yield



Panel B: Yield Spread

FIGURE II

Bond Pricing and Mandatory CSR

*Notes.*These figures show the impact of Mandatory CSR rule on offer yield to maturity and yield spread. Figure A shows the change in offer yield to maturity from pre-CSR rule period to post-CSR rule period. Figure B shows the change in yield spread from pre-CSR rule period to post-CSR rule period. Change in yield and yield spread from pre-CSR period to post-CSR period captures the impact of Indian Companies Act 2013 for unaffected firms but captures the impact of Indian Companies Act 2013 with Mandatory CSR Rule for affected firms.

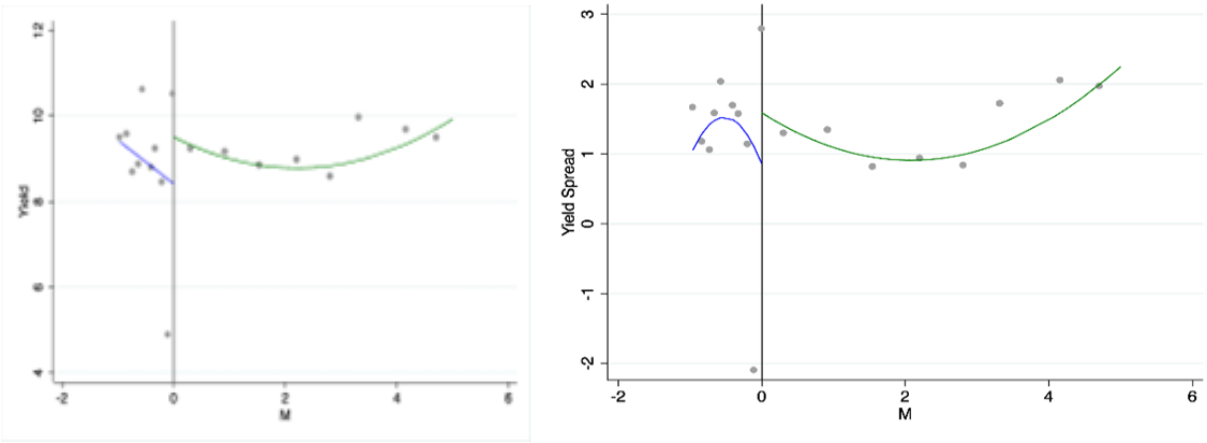


FIGURE III

RDD Plots for Yield and Yield Spread.

*Notes.*These figures show the results of multi-dimensional regression discontinuity design (MRDD) in the post-CSR rule period. Figure A shows the MRDD graph of bond yield between affected and unaffected firms post-CSR rule. Figure B shows the MRDD graph of yield spread between affected and unaffected firms post-CSR rule. Refer to Appendix A for the detailed definitions of variables.

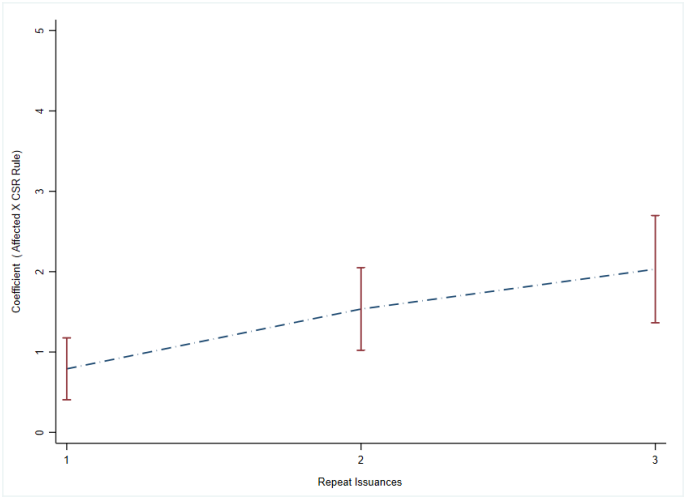


FIGURE IV

Yield on Repeat Interaction with Debt Markets.

Notes. This graph shows the change in yield of affected firms around CSR rule compared to their counterparts on repeat interaction with debt markets. Refer to Appendix A for the detailed definitions of variables.

TABLE I
SAMPLE SELECTION

Filtering Criteria	Issues
Number of Indian bonds issued between 1st Jan 2010 and 31st December 2016.	6,607
Manual matching with the Prowess CMIE Database.	3,737
Missing 'Offer Yield to Maturity'	3,281
Issued between 30th Aug 2010 and 31st Aug 2016	2,413

Notes. This table reports the filtering criteria used to reach the sample data. The source of Indian bond data is SDC Platinum.

TABLE II
BOND ISSUE SAMPLE

PANEL A: AMOUNT ISSUED (MEAN) BY AFFECTED AND UNAFFECTED FIRMS BY YEAR

	(1)	(2)	(3)
Calendar Period	Number	Affected	Unaffected
30th Aug 2010 – 31st Dec 2010	112	96.032	-
1st Jan 2011 – 31st Dec 2011	460	76.405	42.097
1st Jan 2012 – 31st Dec 2012	615	53.555	12.955
1st Jan 2013 – 31st Dec 2013	304	89.133	56.12
1st Jan 2014 – 31st Dec 2014	326	98.595	31.937
1st Jan 2015 – 31st Dec 2015	307	91.651	124.263
1st Jan 2016 – 29th Aug 2016	289	77.776	84.247
	2,413		

PANEL B: AMOUNT ISSUED (MEAN) BY AFFECTED AND UNAFFECTED FIRMS BY YEAR

	(1)	(2)	(3)
	Pre-Rule	Post-Rule	Total
Unaffected	14	47	61
Affected	1,420	932	2,352
Total	1,434	979	2,413

Notes. This table reports the distribution of bond issuances. Panel A reports the yearly distribution of bond issuances and their average value (in USD) based on affected and unaffected firms. Panel B reports the distribution of bonds before and after the enactment of the corporate social responsibility (CSR) rule by affected and unaffected firms. Amounts issued are in million USD.

TABLE III
SUMMARY STATISTICS

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	#N	Mean	Standard Deviation	Median	Min	Max
Yield	2413	9.558	1.317	9.550	4.316	13.4
Yield Spread	2413	1.876	1.473	1.464	0.111	8.2
Issued_Sale	2413	0.092	0.372	0.023	0.001	3.389
Sale	2413	2134.944	2417.945	1103.833	0.769	8656.865
Net Profit	2413	277.293	271.602	182.09	-109.483	774.837
Net Worth	2413	1900.948	1776.322	1134.706	-71.045	5188.324
Size	2413	8.83	1.431	8.912	3.330	11.685
Tobin's Q	2413	2.218	1.275	1.938	0.409	6.018
Leverage	2392	0.519	0.248	0.585	0.022	0.899
Maturity	2413	6.598	13.190	3	0	100
Credit Rank	2317	7.465	0.648	7.500	3	8
CSR Spent	744	0.670	0.342	0.805	0	1
NGO Indicator	979	0.285	0.452	0	0	1
Mandatory CSR Governance	242	4	1	3	2	8

*Notes.*This table reports the summary statistics of the variables used for regression analysis. *Yield* is the offer yield to maturity. *Yield Spread* is the spread between offer yield and the Treasury bill rate. *Yield* and *Yield Spread* are measured in percentages. *Sales* is total firm sales in year t. *Net Profits* is the net profit of a firm in year t. *Net Worth* is measured as the difference between current assets and current liabilities. *Size* is the logarithm of total assets. Sales, net profits, current assets, and current liabilities are in million USD. *Tobin's Q* is measured as the ratio of the market value of equity plus the value of long-term debt to the book value of assets. *Leverage* is measured as total debt by total assets. *Maturity* is the number of years in which a bond is going to mature. $Issued_Sale$ is the amount issued scaled by sale. Amount issued and sale are in million USD. $CreditRank$ is the credit rating of a bond. *CSR Spent* is the excess CSR spending over the CSR expenditure required by law, expressed as a percentage of required spending. $NGOIndicator$ is a dummy variable that takes a value of 1 if a firm provides information about the NGOs through which their CSR expenditures are implemented and is otherwise 0. Refer to Appendix A for detailed definitions of variables.

TABLE IV
BONDS YIELDS AND MANDATORY CSR

VARIABLES	(1) Yield	(2) Yield	(3) Yield	(4) Yield	(5) Yield	(6) Yield	(7) Yield	(8) Yield
CSR Rule	-1.569***	-1.349***	-0.997***	-0.975***	-2.230***	-2.174***	-0.863***	-0.833***
	(0.381)	(0.332)	(0.109)	(0.074)	(0.436)	(0.358)	(0.102)	(0.066)
Affected	-0.653*				-0.548			
	(0.337)				(0.400)			
Affected x CSR Rule	0.791**				1.683***			
	(0.385)				(0.438)			
Affected_R1		-0.623**				-0.743**		
		(0.298)				(0.319)		
Affected_R1 x CSR Rule		0.562*				1.626***		
		(0.336)				(0.361)		
Affected_R2			-1.069***				-0.210***	
			(0.068)				(0.077)	
Affected_R2 x CSR Rule			0.421***				0.343***	
			(0.122)				(0.114)	
Affected_R3				-0.919***				0.236***
				(0.064)				(0.079)
Affected_R3 x CSR Rule				0.434***				0.465***
				(0.100)				(0.089)
Constant	10.53***	10.49***	10.62***	10.34***	18.514***	18.689***	17.645***	18.577***
	(0.335)	(0.296)	(0.057)	(0.045)	(0.521)	(0.475)	(0.375)	(0.382)
Observations	2,413	2,413	2,413	2,413	2,317	2,317	2,317	2,317
R-squared	0.099	0.1	0.192	0.181	0.348	0.347	0.343	0.354
Controls	No	No	No	No	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes. This table reports the regression results of offer yield on mandatory CSR. Panel A reports the results of the baseline regression. Panel B reports the results of the complete model (i.e., with all the controls). CSR Rule is a dummy variable that takes a value of 1 if a bond is issued post 29th August 2013; otherwise, it takes a value of 0. $Affected_R1$ is a dummy variable that takes a value of 1 if the $R1$ (i.e., percentage difference between the firm's net profit and 0.83 million USD) is positive; otherwise, it takes a value of 0. $Affected_R2$ is a dummy variable that takes a value of 1 if the $R2$ (i.e., the percentage difference between the firm's net worth and 83 million USD) is positive; otherwise, it takes a value of 0. $Affected_R3$ is a dummy variable that takes a value of 1 if the $R3$ (i.e., the percentage difference between the firm's sale and 167 million USD) is positive; otherwise, it takes a value of 0. Affected is a dummy variable that takes a value of 1 if the firm is affected by the mandatory CSR rule i.e., $R1, R2$, or $R3$ is positive; otherwise, it takes a value of 0. Yield is the offer yield to maturity, measured as a percentage. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE V
BONDS YIELD-SPREAD AND MANDATORY CSR

VARIABLES	(1) Yield Spread	(2) Yield Spread	(3) Yield Spread	(4) Yield Spread
CSR Rule	-1.418***	-1.548***	-0.585***	-0.616***
	(0.418)	(0.343)	(0.098)	(0.063)
Affected	-0.228			
	(0.384)			
Affected x CSR Rule	1.030**			
	(0.420)			
Affected_R1		-0.583*		
		(0.306)		
Affected_R1 x CSR Rule		1.157***		
		(0.346)		
Affected_R2			-0.164**	
			(0.074)	
Affected_R2 x CSR Rule			0.211*	
			(0.109)	
Affected_R3				0.307***
				(0.076)
Affected_R3 x CSR Rule				0.390***
				(0.085)
Constant	9.890***	10.205***	9.382***	10.406***
	(0.499)	(0.455)	(0.358)	(0.365)
Observations	2,317	2,317	2,317	2,317
R-squared	0.338	0.338	0.335	0.349
Controls	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes

Notes. This table reports the regression results of yield spread on mandatory CSR. *CSR Rule* is a dummy variable that takes a value of 1 if a bond is issued post 29th August 2013; otherwise, it takes a value of 0. $Affected_R1$ is a dummy variable that takes a value of 1 if the R1 (i.e., percentage difference between the firm's net profit and 0.83 million USD) is positive; otherwise, it takes a value of 0. $Affected_R2$ is a dummy variable that takes a value of 1 if the $R2$ (i.e., percentage difference between the firm's net worth and 83 million USD) is positive; otherwise, it takes a value of 0. $Affected_R3$ is a dummy variable that takes a value of 1 if the $R3$ (i.e., percentage difference between the firm's sale and 167 million USD) is positive; otherwise, it takes a value of 0. *Affected* is a dummy variable that takes a value of 1 if the firm is affected by the mandatory CSR rule i.e., $R1, R2$, or $R3$ is positive; otherwise, it takes a value of 0. $YieldSpread$ is the spread between the offer yield and the Treasury bill rate. *Yield* and *Yield Spread* are measured in percentages. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE VI
BOND AMOUNT ISSUED AND MANDATORY CSR

	(1)	(2)	(3)	(4)
VARIABLES	Issued_Sale	Issued_Sale	Issued_Sale	Issued_Sale
CSR Rule	0.136*	0.303***	0.156***	0.043***
	(0.079)	(0.065)	(0.020)	(0.013)
Affected	-0.796***			
	(0.073)			
Affected x CSR Rule	-0.144*			
	(0.079)			
Affected_R1		-0.422***		
		(0.059)		
Affected_R1 x CSR Rule		-0.309***		
		(0.066)		
Affected_R2			0.039***	
			(0.015)	
Affected_R2 x CSR Rule			-0.162***	
			(0.022)	
Affected_R3				-0.007
				(0.016)
Affected_R3 x CSR Rule				-0.033*
				(0.017)
Constant	0.682***	0.349***	0.105	0.134*
	(0.094)	(0.086)	(0.072)	(0.075)
Observations	2,317	2,317	2,317	2,317
R-squared	0.303	0.245	0.091	0.072
Controls	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes

*Notes.*This table reports the regression results of the bond amounts issued on mandatory CSR. $Issued_Sale$ is the amount issued scaled by sale. Amount Issued and Sale are in million USD. $CSRRule$ is a dummy variable that takes a value of 1 if a bond is issued post 29th August 2013; otherwise, it takes a value of 0. $Affected_R1$ is a dummy variable that takes a value of 1 if the R1 (i.e., percentage difference between the firm's net profit and 0.83 million USD) is positive; otherwise, it takes a value of 0. $Affected_R2$ is a dummy variable that takes a value of 1 if the $R2$ (i.e., percentage difference between the firm's net worth and 83 million USD) is positive; otherwise, it takes a value of 0. $Affected_R3$ is a dummy variable that takes a value of 1 if the R3 (i.e., percentage difference between the firm's sale and 167 million USD) is positive; otherwise, it takes a value of 0. $Affected$ is a dummy variable that takes a value of 1 if the firm is affected by the mandatory CSR rule i.e., $R1, R2$, or $R3$ is positive; otherwise, it takes a value of 0. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE VII
FUTURE CASH FLOWS, YIELD SPREAD, AND MANDATORY CSR

	(1)	(2)
VARIABLES	FCF_{t+1}	Yield Spread
CSR Rule	0.517***	
	(0.120)	
Affected	0.047	-0.08
	(0.114)	(0.343)
Affected x CSR Rule	-0.495***	
	(0.120)	
FCF_{t+1}(Fitted)		-2.260***
		(0.831)
Constant	0.091	9.940***
	(0.131)	(0.552)
Observations	2,203	2,317
R-squared	0.135	0.357
Controls	Yes	Yes
Industry	Yes	Yes

*Notes.*This table provides the results of the two stage least square (2SLS) regression and endogeneity tests. Column (1) provides the results for the first stage, with future cash flow(FCF) as the dependent variable. Column (2) provides the results of the second stage, where $YieldSpread$ is the dependent variable. $CSRRule$ is a dummy variable that takes a value of 1 if a bond is issued after 29th August 2013; otherwise, it takes a value of 0. $R1$ is the percentage difference between the firm's net profit and 0.83 million USD. $R2$ is the percentage difference between the firm's net worth and 83 million USD. $R3$ is the percentage difference between the firm's sale and 167 million USD is positive. $Affected$ is a dummy variable that takes a value of 1 if the firm is affected by the mandatory CSR rule i.e., $R1, R2$, or $R3$ is positive; otherwise, it takes a value of 0. FCF_{t+1} is free cash flow of the firm at $t+1$. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE VIII
MULTI-DIMENSION REGRESSION DISCONTINUITY DESIGN

Affected Criteria	Method	Covariates	(1) Yield	(2) Yield Spread
Criteria I	Bias-corrected	Yes	1.255***	0.765*
			(0.427)	(0.425)
Criteria II	Bias-corrected	Yes	0.466**	-0.563***
			(0.020)	(0.185)
Criteria III	Bias-corrected	Yes	0.069	1.044***
			(0.135)	(0.095)
All Three Criteria	Bias-corrected	Yes	2.408*	1.322
			(1.920)	(1.162)

*Notes.*This table provides the results for multi-dimension regression discontinuity design (MRDD) tests. Panel A reports the results using Yield as a dependent variable. Panel B reports the results using Yield Spread as a dependent variable. Criteria I-III are threshold variables: sales, profit, and net worth. The bias-corrected method uses a bias-corrected RD estimator with a conventional variance estimator. All tests include covariates such as *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE IX
NEAREST NEIGHBOR MATCHED SAMPLE ANALYSIS

PANEL A: DISTRIBUTION OF AFFECTED AND UNAFFECTED OBSERVATIONS PRE AND POST CSR RULE

	(1)	(2)	(3)
	Unaffected	Affected	Total
Pre-CSR Rule	7	28	35
Post-CSR Rule	21	58	79
Total	28	86	114

PANEL B: COVARIATE BALANCE

	(1)		(2)	
	Mean		t-test	
Variable	Unaffected	Affected	t	p¿t
Size	8.604	5.669	10.32	0
Tobin's Q	1.864	1.537	1.2	0.232
Leverage	0.389	0.478	-2	0.048
Years of Maturity	6.937	6.657	0.09	0.931
Credit Rank	6.369	6.73	-1.37	0.173

PANEL C: DIFFERENCES-IN-DIFFERENCES

	(1)	(2)	(3)
VARIABLES	Yield	Yield Spread	Issued_Sale
CSR Rule	-2.175***	-1.310**	0.17
	(0.577)	(0.549)	(0.338)
Affected	-1.129	-0.352	-0.488
	(0.691)	(0.657)	(0.402)
Affected x CSR Rule	2.404***	1.277**	-0.255
	(0.654)	(0.623)	(0.384)
Constant	13.745***	5.252***	0.024
	(1.133)	(1.078)	(0.657)
Observations	114	114	114
R-squared	0.475	0.44	0.301
Controls	Yes	Yes	Yes
Industry	Yes	Yes	Yes

Notes. This table provides the results for difference-in-differences regression after matching. Panel A reports the distribution of affected and unaffected firms before and after the CSR rule. Panel B reports the covariate balance between affected and unaffected issuers after matching. Panel C reports the difference-in-differences regression results. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE X
EFFECT OF IDENTIFIED NGO AGENCIES

VARIABLES	(1) Yield	(2) Yield Spread	(3) Issued_Sale	(4) Yield	(5) Yield Spread	(6) Issued_Sale
Affected	0.629	0.569	-1.052***			
	(0.471)	(0.453)	(0.268)			
NGO Indicator	0.969**	0.915*	-0.940***			
	(0.486)	(0.479)	(0.251)			
NGO Indicator X Affected	-0.941*	-0.868*	0.935***			
	(0.499)	(0.491)	(0.249)			
Amount Spent (in %)				-0.414***	-0.415***	-0.01
				(0.078)	(0.074)	(0.008)
Constant	16.585***	8.729***	0.525*	18.887***	10.834***	-0.02
	(0.938)	(0.907)	(0.307)	(0.854)	(0.838)	(0.046)
Observations	940	940	940	727	727	727
R-squared	0.385	0.359	0.367	0.47	0.449	0.043
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes

Notes. This table explains the cross-section differences in yield and amount issued due to incumbent foundation or third-party CSR implementing agency in the post-CSR rule period. Columns (1)-(3) show the results for cross-section differences in bond characteristics based on whether NGOs (incumbent or third-party) information is provided by the issuer. Columns (4)-(6) show the results for cross-section differences in the bond characteristics of affected issuers based on the amount spent as a percentage of the amount expected. $Yield$ is the offer yield to maturity. *Yield Spread* is the spread between the offer yield and the Treasury bill rate. Yield and Yield Spread are measured in percentages. $Issued_Sale$ is the amount issued scaled by sale. Amount Issued and Sale are in a million USD. *NGO Indicator* is a dummy variable which is equal to 1 if the firm provides detail on agencies used for CSR disbursement; otherwise equal to 0. Amount Spent is actual expenditure on CSR activities with respect to the prescribed amount. It is measured in percentage. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of the variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE XI

CSR RULE COMMENCEMENT DATE AND BOND ISSUANCE

VARIABLES	(1) Yield	(2) Yield Spread	(3) Amount Issued
CSR Rule (Comm.)	-2.150***	-2.009***	0.118***
	(0.753)	(0.732)	(0.043)
Affected	-0.58	-0.507	0.04
	(0.704)	(0.685)	(0.040)
CSR Rule (Comm.) x Affected	1.458*	1.402*	-0.116***
	(0.755)	(0.734)	(0.043)
Constant	18.623***	10.661***	0.039
	(0.833)	(0.810)	(0.048)
Observations	1,427	1,427	1,427
R-squared	0.4	0.405	0.103
Controls	Yes	Yes	Yes
Industry	Yes	Yes	Yes

Notes. This table provides the results for the difference-in-differences regression when the commencement date (1st April 2014) is used as the CSR Rule adoption date. The pre- and post-sample periods are two years before and two years after the commencement date. Column (1) shows the results for $Yield$. Column (2) shows the results for *Yield Spread*. Column (3) shows the results for *Amount Issued*. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE XII
FIRM OWNERSHIP STRUCTURE AND CSR RULE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Yield	Yield Spread	Issued_Sale	Yield	Yield Spread	Issued_Sale	Yield	Yield Spread	Issued_Sale
Conc_Hold	-0.276***	-0.262***	0.028***						
	(0.058)	(0.056)	(0.010)						
Govt Owned				-1.151***	-1.150***	0.057***			
				(0.079)	(0.075)	(0.014)			
BG							0.891***	0.916***	-0.052***
							(0.073)	(0.070)	(0.013)
Conc_Hold X Affected X CSR Rule	0.144	0.177**	-0.026*						
	(0.090)	(0.086)	(0.015)						
Govt Owned X Affected X CSR Rule				0.326***	0.297***	-0.015			
				(0.110)	(0.105)	(0.020)			
BG X Affected X CSR Rule							-0.201*	-0.260***	0.02
							(0.104)	(0.099)	(0.018)
CSR Rule	-2.115***	-1.312***	0.127	-2.168***	-1.354***	0.132*	-2.051***	-1.240***	0.127
	(0.434)	(0.416)	(0.079)	(0.414)	(0.394)	(0.078)	(0.419)	(0.399)	(0.078)
Affected	-0.519	-0.205	-0.795***	-0.573	-0.253	-0.796***	-0.374	-0.055	-0.805***
	(0.398)	(0.382)	(0.073)	(0.380)	(0.362)	(0.073)	(0.384)	(0.367)	(0.073)
Affected X CSR Rule	1.466***	0.805*	-0.118	1.531***	0.881**	-0.136*	1.672***	1.066***	-0.151*
	(0.441)	(0.423)	(0.080)	(0.416)	(0.396)	(0.079)	(0.428)	(0.409)	(0.080)
Observations	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317	2,317
R-squared	0.356	0.345	0.306	0.413	0.41	0.31	0.4	0.396	0.309
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes.*This table provides the difference-in-differences results for different ownership structures. Columns (1) – (3) show results for ownership concentration to promoters. Columns (4)– (6) show results if government holds significant ownership in a firm. Columns (7)-(9) show results for business group ownership. *Conc_Hold* is a dummy variable that takes a value of 1 if promoters holding is greater than median; otherwise, it takes a value of 0. *Govt Owned* is a dummy variable that takes a value of 1 if government ownership in a firm is greater than median; otherwise, it takes a value of 0. *BG* is a dummy variable that takes a value of 1 if a firm belongs to a business group; otherwise, it takes a value of 0. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. *Industry* is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE XIII
CORPORATE GOVERNANCE AND CSR RULE

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Yield	Yield Spread	Issued_Sale	Yield	Yield Spread	Issued_Sale
BIG4	0.299***	0.264***	-0.028**			
	(0.061)	(0.059)	(0.011)			
BI				0.199***	0.264***	-0.009
				(0.059)	(0.057)	(0.011)
CSR Rule	-1.514***	-0.828**	0.454***	-1.207***	-0.353	0.175**
	(0.405)	(0.389)	(0.077)	(0.410)	(0.394)	(0.078)
Affected	0.638*	0.867**	-0.615***	1.205***	1.374***	-0.567***
	(0.357)	(0.343)	(0.069)	(0.323)	(0.311)	(0.062)
Big4 X CSR Rule	1.565***	1.602***	-1.040***			
	(0.537)	(0.515)	(0.098)			
BI X CSR Rule				0.935**	0.473	0.340***
				(0.397)	(0.382)	(0.074)
Affected X CSR Rule	0.893**	0.342	-0.463***	0.486	-0.112	-0.172**
	(0.409)	(0.392)	(0.078)	(0.413)	(0.397)	(0.078)
Big4 X CSR Rule X Affected	-1.402***	-1.368***	1.038***			
	(0.539)	(0.517)	(0.098)			
BI X CSR Rule X Affected				-0.766*	-0.474	-0.353***
				(0.400)	(0.384)	(0.074)
Constant	13.835***	5.549***	0.882***	13.221***	4.921***	0.883***
	(0.390)	(0.375)	(0.074)	(0.350)	(0.336)	(0.066)
Observations	2,392	2,392	2,392	2,392	2,392	2,392
R-squared	0.321	0.312	0.308	0.31	0.298	0.281
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes

*Notes.*This table provides the results for difference-in-differences for board independence and Big 4 auditors. The pre- and post-sample are two years before and two years after the commencement date. Columns (1) –(3) show results for $BIG4$. Columns (4) – (6) show results for board independence. BI is a dummy variable that takes a value of 1 if a firm has an independent board; otherwise, it takes a value of 0. $BIG4$ is a dummy variable that takes a value of 1 if a firm is audited by a Big 4 auditor or their affiliates; otherwise, it takes a value of 0. Industry is industry fixed effects. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Refer to Appendix A for detailed definitions. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE XIV
MANDATORY CSR GOVERNANCE AND DEBT MARKET

VARIABLES	(1) Yield Spread	(2) Yield Spread	(3) Yield	(4) Yield	(5) Issued_Sale	(6) Issued_Sale
Mandatory CSR Governance	-0.150***	0.034	-0.103*	0.023	0.010***	0.012***
	(0.048)	(0.065)	(0.053)	(0.066)	(0.002)	(0.003)
Constant	1.780***	10.881***	9.588***	18.339***	-0.012*	0.105*
	(0.184)	(1.457)	(0.204)	(1.489)	(0.006)	(0.059)
Observations	242	217	242	217	242	217
R-squared	0.063	0.384	0.057	0.477	0.211	0.252
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

*Notes.*This table provides the regression results of mandatory CSR governance on cost of debt for firms affected by CSR rule. *Mandatory CSR Governance* is measured as number of members in CSR committee. Columns (1) –(2) show results for yield spread. Columns (3) – (4) show results for yield. Columns (1) –(2) show results for . Industry is industry fixed effects. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Refer to Appendix A for detailed definitions. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

APPENDIX A
VARIABLE DEFINITION AND DESCRIPTION

VARIABLE	DEFINITION
Yield	The bond's yield to maturity as reported by SDC Platinum. Measured in percentage.
Yield spread	Yield to maturity minus matched Indian Treasury Interest Rate
Issued_Sale	Ratio of the amount issued and sale. The amount issued and sale are in millions of USD.
Maturity	Difference between years of maturity minus years of issuing the bond.
CSR Rule	Dummy variable equal to 1 if the bond is issued after 29th Aug 2013 and otherwise equal to 0.
CSR Rule (Comm.)	Dummy variable equal to 1 if the bond is issued after 1st April 2014 and otherwise equal to 0.
R1	The percentage difference between the firm's net profit and 0.83 million USD .
R2	The percentage difference between the firm's net worth and 83 million USD
R3	The percentage difference between the firm's sale and 167 million USD .
M	The minimum positive value of R1, R2, and R3 if at least one of them is positive or if the maximum values of R1, R2, and R3 are all negative
Affected_R1	Dummy variable equal to 1 if R1¿0 and otherwise equal to 0
Affected_R2	Dummy variable equal to 1 if R2¿0 and otherwise equal to 0
Affected_R3	Dummy variable equal to 1 if R3¿0 and otherwise equal to 0
Affected	Dummy variable equal to 1 if M¡ 0 and otherwise equal to 0
Size	Logarithm of total assets. Total assets is measured in million USD.
Leverage	Ratio of long-term debt to total assets
ROA	The ratio of net income to total assets
Tobin's Q	Mkt Value of Equity / (Mkt Value of Equity + Book Value of LT Debt)
BI	Dummy variable equal to 1 if the fraction of independent directors is higher than the sample median
BIG4	Dummy variable equal to 1 if the auditor of the firm is aligned with Deloitte, E Y, PWC, or KPMG
BG	Dummy variable equal to 1 if the firm is aligned with a business group and otherwise equal to 0
Conc_Hldg	Dummy variable equal to 1 if the promoter holding is greater than the median holding in the sample and otherwise equal to 0.
Net Profit	Net profit of a firm. Measured in million USD.
Net Worth	Total assets minus total liabilities. Measured in million USD.
Credit Rank	Rank for securities rating grade assigned based on ratings given by different rating agencies.
NGO Indicator	Dummy variable is equal to 1 if the firm provides detail on agencies used for CSR disbursement; otherwise equal to 0.
Amount Spent	Amount spent on CSR activities with respect to the prescribed amount. It is measured in percentage.
Volatility	Stock return volatility using one-year daily return data. It is measured in percentage.

APPENDIX B

TABLE B1: CSR SPENDING AND INFORMATION ON NGOs

PANEL A: AMOUNT EXPECTED AND AMOUNT SPENT THROUGH DIRECT AND IMPLEMENTING AGENCIES

	(1)	(2)	(3)	(4)
Company Name	Amount Expected	Amount Spent	Amount to Direct Agency	Amount to Indirect Agency
Reliance Industries Ltd.	8.96	8.006	7.737	0.269
NTPC Ltd.	4.52	7.757	3.878	3.878
Reliance Industries Ltd.	5.866	5.194	4.67	0.524
Power Finance Corp. Ltd.	6.159	4.185	0	4.185
Oil & Natural Gas Corp. Ltd.	3.975	3.922	3.786	0.136
HDFC Bank Ltd.	3.335	3.335	0	3.335
Oil & Natural Gas Corp. Ltd.	4.263	2.844	0.001	2.843
ICICI Bank Ltd.	3.314	2.832	1.416	1.416
Tata Steel Ltd.	0	2.472	2.472	0
TVS Motor Co. Ltd.	11.779	1.714	0.006	1.708

PANEL B: CSR ACTIVITIES, NAMES OF DIRECT AND IMPLEMENTING AGENCIES

Company Name	CSR Activities	Direct Agency Names	In-Direct Agency Names
Reliance Industries Ltd.	Schedule (I)	Reliance Foundation	-
NTPC Ltd.	Schedule (I)	NTPC foundation	-
Reliance Industries Ltd.	Schedule (II)	Reliance Foundation	-
Power Finance Corp. Ltd.	Schedule (I)	-	Energy & Resources Institute; The Gramin Vikas Trust; Hindustan Prefab Ltd.; Ircon Infrastructure Services Ltd.
Oil & Natural Gas Corp. Ltd.	Schedule (X)	ONGC Foundation	-
HDFC Bank Ltd.	Schedule (X)	-	Indo Global Social Service Society; Krushi Vikas va Gramin Prashikshan Sanstha, Mysore; Resettlement & Development Agency; Society to Heal Aid Restore Educate; Watershed Organisation Trust
Oil & Natural Gas Corp. Ltd.	Schedule (I)	ONGC Foundation	Help Age India; Sulabh International Social Service Organization
ICICI Bank Ltd.	Schedule (X)		Business Correspondent Network
Tata Steel Ltd.	Schedule (I)	TCS, TSFIF, TSRDS	
TVS Motor Co.Ltd.	Schedule (I)	-	Sri Sathya Sai Central Trust; Srinivasan Services Trust

*Notes.*This table provides information on the highest CSR paid firms and their NGOs for the year 2015. Panel A reports the names of the 10 highest CSR spend firms, the expected amount of CSR Spend, the actual spend amounts. Panel B reports how much of spending was done through direct agencies of the firm and how much was indirect (i.e., through agencies external to the firm). Panel B reports the specific CSR activities of the firm and the name of the direct and indirect agencies through which the amounts were spent. All reported expenditures are measured in million USD.

TABLE B2: MANDATORY CSR AND DEBT MARKET

	(1)	(2)	(3)	(4)	(5)	(6)
	Affected	Unaffected	Affected	Unaffected	Affected	Unaffected
VARIABLES	Yield	Yield	Yield Spread	Yield Spread	Amount Issued	Amount Issued
CSR Rule	-0.546***	-2.658**	-0.388***	-1.466	-0.008**	0.556
	(0.044)	(0.982)	(0.042)	(0.956)	(0.004)	(0.602)
Size	-0.377***	-0.530	-0.387***	-0.270	-0.012***	0.177
	(0.028)	(0.523)	(0.027)	(0.509)	(0.002)	(0.321)
TobinQ	-0.066***	0.204	-0.019	0.133	-0.007***	0.299
	(0.018)	(0.507)	(0.017)	(0.494)	(0.001)	(0.309)
Leverage	-0.698***	1.616	-0.629***	0.726	-0.056***	-1.310
	(0.138)	(1.787)	(0.132)	(1.740)	(0.011)	(1.146)
Maturity	0.004**	-0.015	0.005***	-0.003	0.001***	0.383***
	(0.002)	(0.029)	(0.002)	(0.029)	(0.000)	(0.134)
CreditRank	-0.624***	-0.631*	-0.617***	-0.312	0.013***	0.459**
	(0.044)	(0.341)	(0.042)	(0.332)	(0.004)	(0.217)
Constant	18.285***	18.106***	10.083***	6.294	0.103***	-4.918*
	(0.372)	(4.329)	(0.356)	(4.216)	(0.031)	(2.826)
Observations	2,282	35	2,282	35	2,281	34
R-squared	0.354	0.280	0.348	0.119	0.038	0.365
Industry	Yes	Yes	Yes	Yes	Yes	Yes

Notes. This table reports the regression results of yield and yield spread on mandatory CSR for affected firms and unaffected firms. *CSR Rule* is a dummy variable that takes a value of 1 if a bond is issued post 29th August 2013; otherwise, it takes a value of 0. $Yield$ is the offer yield to maturity measured in percentage. $YieldSpread$ is the spread between the offer yield and the Treasury bill rate measured in percentage. *Yield* and *Yield Spread* are measured in percentages. $Affected$ firms are those which are affected by mandatory CSR rule. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE B3: DEBT MARKET, STOCK VOLATILITY AND MANDATORY CSR

VARIABLES	(1) Yield	(2) Yield Spread	(3) Amount Issued
CSR Rule	-2.265***	-1.456***	0.127
	(0.435)	(0.416)	(0.078)
Affected	-0.530	-0.208	-0.795***
	(0.399)	(0.382)	(0.073)
Affected X CSR Rule	1.734***	1.085***	-0.132*
	(0.437)	(0.418)	(0.079)
Size	-0.366***	-0.383***	-0.012***
	(0.027)	(0.026)	(0.005)
Tobin's Q	-0.032	0.017	0.002
	(0.020)	(0.019)	(0.003)
Leverage	-0.573***	-0.500***	-0.003
	(0.133)	(0.128)	(0.023)
Years of Maturity	0.004**	0.005***	0.001**
	(0.002)	(0.002)	(0.000)
Credit Rank	-0.597***	-0.570***	0.038***
	(0.041)	(0.040)	(0.007)
Volatility	0.203***	0.221***	0.038***
	(0.055)	(0.053)	(0.009)
Constant	17.932***	9.259***	0.577***
	(0.543)	(0.520)	(0.097)
Observations	2,317	2,317	2,317
R-squared	0.352	0.343	0.308
Industry	Yes	Yes	Yes

Notes. This table reports the regression results of yield, yield spread, and of amount issued on mandatory CSR controlling for stock volatility. *CSR Rule* is a dummy variable that takes a value of 1 if a bond is issued post 29th August 2013; otherwise, it takes a value of 0. $Yield$ is the offer yield to maturity measured in percentage. $YieldSpread$ is the spread between the offer yield and the Treasury bill rate measured in percentage. *Yield* and *Yield Spread* are measured in percentages. $Affected$ firms are those which are affected by mandatory CSR rule. $Volatility$ is the stock return volatility using one-year daily return data. It is measured in percentage. $Industry$ is industry fixed effects. Column (1) shows the results for $Yield$. Column (2) shows the results for *Yield Spread*. Column (3) shows the results for *Amount Issued*. Controls are *Size, Leverage, Tobin's Q, Maturity* and *Credit Rank*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

TABLE B4: VOLUNTARY CSR AND DEBT MARKET

VARIABLES	(1) Yield	(2) Yield Spread	(3) Amount Issued
CSR Rule	-2.137***	-1.348**	1.013***
	(0.652)	(0.625)	(0.137)
Affected	-0.645	-0.305	0.018
	(0.626)	(0.600)	(0.133)
Affected x CSR Rule	1.607**	0.994	-1.011***
	(0.655)	(0.628)	(0.138)
Size	-0.293***	-0.328***	0.010*
	(0.035)	(0.033)	(0.006)
TobinQ	-0.132***	-0.057***	-0.002
	(0.023)	(0.022)	(0.004)
Leverage	-0.403**	-0.269	0.102***
	(0.178)	(0.171)	(0.031)
Maturity	0.003	0.006***	0.000
	(0.002)	(0.002)	(0.000)
CreditRank	-0.521***	-0.483***	0.042***
	(0.049)	(0.047)	(0.009)
Constant	17.290***	8.652***	-0.433***
	(0.750)	(0.719)	(0.155)
Observations	1,460	1,460	1,460
R-squared	0.295	0.279	0.341
Industry	Yes	Yes	Yes

Notes. This table reports the regression results of mandatory CSR on debt market for firms engage in voluntary CSR pre-rule. *CSR Rule* is a dummy variable that takes a value of 1 if a bond is issued post 29th August 2013; otherwise, it takes a value of 0. $Yield$ is the offer yield to maturity measured in percentage. $YieldSpread$ is the spread between the offer yield and the Treasury bill rate measured in percentage. *Yield* and *Yield Spread* are measured in percentages. $Affected$ firms are those which are affected by mandatory CSR rule. $Volatility$ is the stock volatility in percentage. $Industry$ is industry fixed effects. Column (1) shows the results for $Yield$. Column (2) shows the results for *Yield Spread*. Column (3) shows the results for *Amount Issued*. Industry is industry fixed effects. Refer to Appendix A for detailed definitions of variables. All control variables are winsorized at 1%. *, **, and *** show significance at 10%, 5%, and 1%.

Appendix C

Table C1: ESG app: Proof-of-Work of Open-source Large Language Model (LLM)

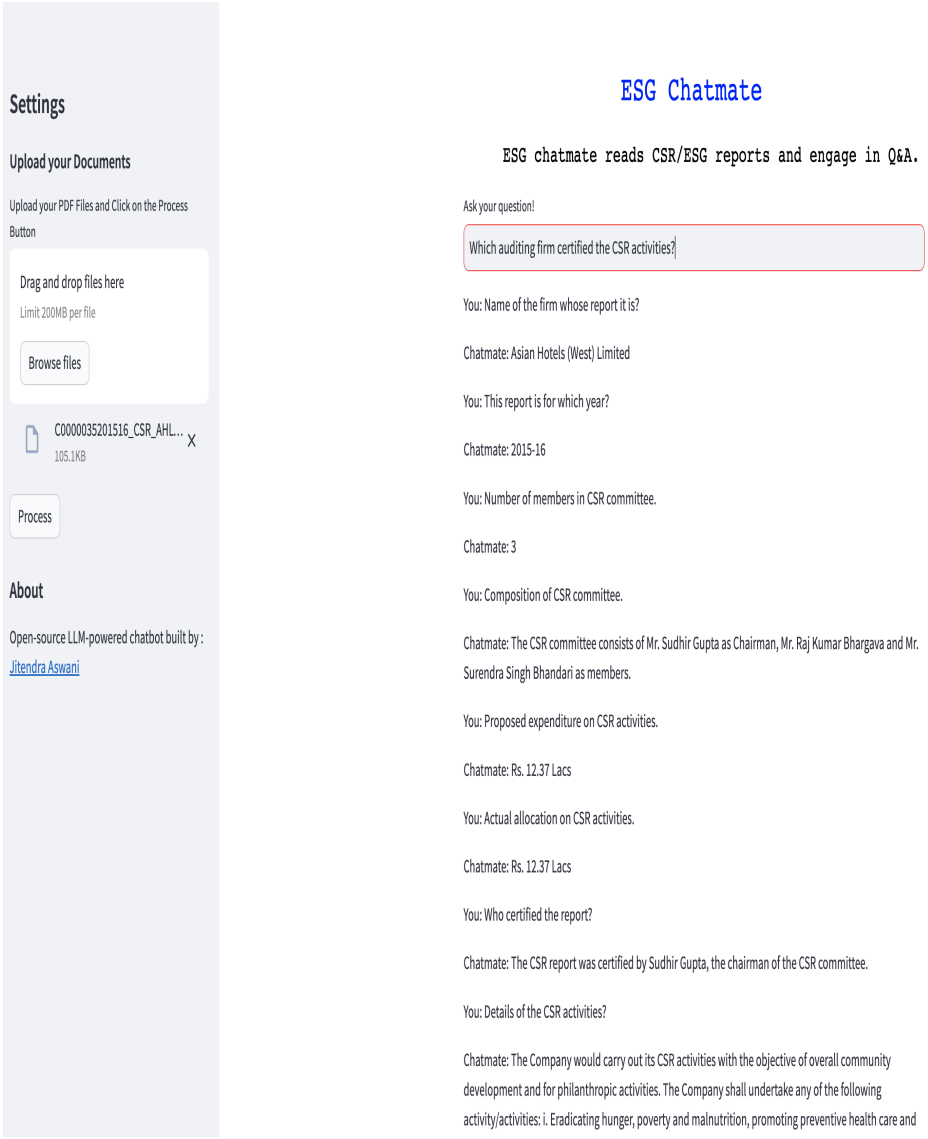


Table C2: Snapshot of Large Language Model (LLM) Acquired Data

	Firm Name	Year	Number of CSR Committee Members	Member Names	Total Amount Spent	Total Amount Unspent	Sectors	Details of CSR Activities	Implementation and Monitoring of CSR policy	Compliance to Allocate Prescribed CSR Amount	Reason for Not Spending Prescribed Amount
1	Ponni Sugars (Erode) Limited	2017-18	3 members	The CSR committee members are Mr N Gopala Ratnam, Chairman, Mr N R Krishnan, Independent Director and Mr N Ramanathan, Managing Director.	13 lakhs	nt unspent is not appli	Livelihood, Rural development, Education, Environment	al area2. Strengthening rural infra:	Yes, the implementation and monitoring of CSR Policy is in compliance with CSR objectives and policy of the company.	No, the company has not failed to spend the two per cent, of the average net profit of the last three financial years, as CSR or any part thereof.	Not applicable
2	KOOCL's CSR report	2017-18	5 members in the CSR committee	CSR committee members are Sri Madhav Lal, Chairman, Dr. Deepika Sharma, Member , Sri N. Vidyananda, Member , Sri SK Gorai, Member	15.98 Lakhs	Nil	The firm invested CSR expenditure in the following sectors: 1. Swachh Vidyalaya Abhiyan/ Drinking water 2. Promotion of Swachh Bharath Abhiyan 3. Animal Welfare 4. Medical Assistance to poor & economically weaker section of the society 5. Promotion of Education 6. Support for Swachh Bharath Abhiyan by construction of toilets	of Toilets in 6 Schools at Mangalur	Yes, the implementation and monitoring of CSR Policy is in compliance with CSR objectives and policy of the company.	No, the company has not failed to spend the two per cent of the average net profit of the last three financial years, as CSR or any part thereof.	Not Applicable
3	is the CSR report of QUESS COR	This report is for the year 2016-17.	3	The CSR committee members are: Ms. Revathy Ashok, Chairperson, Mr. Ajit Isaac, and Mr. Pravir Kumar Vohra.	1.52 crores	`0.18 crores	The company invested CSR expenditure in the following sectors: Education, Health, Disaster Management	nme2. Improvement of School Envi	The implementation and monitoring of the CSR Policy is in compliance with the CSR objectives and policy of the Company.	Yes, the company has failed to spend 0.18 crores as CSR in the financial year 2016-17 due to delay in completion of the project	Due to delay in completion of the project
4	Blue Dart Express Limited	2015-2016	3	The CSR Committee of the Board comprises of the following: Â‹ Sharad Upasani, Chairman of the Committee Â‹ Malcolm Monteiro, Member of the Committee	4,05,00,000	00 has been spent sorphans; setting up old age hom	The company has spent ` 4,05,00,000 in the financial year 2015-16 on various CSR activities.		Yes, the implementation and monitoring of CSR Policy is in compliance with CSR objectives and policy of the company.	Yes, the company has failed to spend the two per cent, of the average net profit of the last three financial years, as CSR or any part thereof.	unspent amount is `1,01,03,701
5	Sun TV Network Ltd	2016-2017	3	Mrs. Kavery Kalanithi - Member Mr. Nicholas Martin Paul - Member	nt for the finan	7.88 Crore	The CSR expenditure was invested in the following sectors: - Education - Arts and Culture	7.25 Direct Total 15.67 15.67and N	Yes	Yes, the company has failed to spend the two per cent, of the average net profit of the last three financial years, as CSR or any part thereof.	The company has expended major portion of 2% of its average net profits made during the immediately three preceding financial years as per section 135(5) of Companies Act, 2013 in pursuance of its corporate social responsibility policy since the company is yet to identify sutiable projects.

Table C3: Reasons for Not Spending Prescribed CSR Amount

I. Struggling to Identify the Suitable CSR activities

1. The company did not spend 2% CSR because it was not able to identify a suitable project to undertake. (IFB Agro Industries Limited, 2015)

2. Non-identification of appropriate projects / activities in line with the CSR policy of the Company. (Kajaria Ceramics, 2016)

3. The project was still under the evaluation strategy, the company could not spent the allocable amount. (Gati Limited, 2015)

II. Struggling to Identify the Suitable Implementing agencies

1. The tie-up with the NGOs is yet to gather momentum and therefore the full contribution was not completed. (Aptech Limited, 2015)

2. The company has not been able to spent 2% of the average net profit of last three financial year (Rs. 50.08 Lacs) due to the non- availability of the suitable nodal agencies to implement the projects identified by the company. (PTL Enterprises Limited, 2015)

3. The company is evaluating more CSR agencies and NGOs for implementing the company's CSR policy over a period of time in addition to its existing CSR partners as named in the Board's Report. The unspent amount will be spent in the near future as per the CSR Policy of the Company. (Ujaas Energy Limited, 2015)

III. Initiating the Pilot Projects

1. The Company's CSR initiatives usually involve setting the foundation of various programs at a small scale to learn from on-ground realities, getting feedback from community and then putting an enhanced sustainable model to ensure maximum benefit to the community. For this reason, during the year, the Company's spend on the CSR activities has been less than the limits prescribed under Companies Act, 2013. (Poly Medicure, 2016)

2. The company has made contributions to the projects on a pilot basis and the CSR Committee is closely monitoring the progress, before actually making further contributions for larger projects. (Neuland Laboratories Limited, 2015)

3. Your Company's CSR projects are multi-year projects. Your Company believes in creating sustainable programs that empowers communities. This year, our focus was to meet the project goals and create standards for reporting and monitoring. Due diligence process has been followed during the entire project cycle. We are evaluating communities to expand our projects. (Tata Consultancy Services Limited, 2016)

IV. Others:

Law and Order

1. CSR works which are being executed by Kishanganga Project (JK) suffered badly due to law-and-order problems in and around Bandipora (J&K). (NHPC Limited)

Business Expansion or Dearth of Capital

1. The company is in expansion mode and required funds for its working capital as well as expansion hence, the Board has decided not to make any expenditure for CSR activity for the financial year 2015-16. The Company understands its social responsibility and will in future make expenditure for CSR activities as and when it found appropriate. (Vidhi dyestuffs Manufacturing Limited, 2015)

Appendix D

COMPONENTS OF TRANSFORMER ARCHITECTURE

These components form the basis of the Transformer architecture, enabling it to effectively handle a variety of sequence-to-sequence tasks without relying on recurrent neural networks (RNNs) or convolutional neural networks (CNNs).

1. Scaled Dot-Product Attention:

$$\text{Attention}(Q, K, V) = \text{softmax}\left(\frac{QK^T}{\sqrt{d_k}}\right)V$$

Here, Q, K, and V are matrices representing queries, keys, and values, respectively. The attention weights are computed by taking the dot product of the query with all keys, dividing each by $\sqrt{d_k}$ (the dimension of the keys), and applying a softmax function.

2. Multi-Head Attention:

$$\text{MultiHead}(Q, K, V) = \text{Concat}(\text{head}_1, ..., \text{head}_h)W^O$$

where each $\text{head}_i = \text{Attention}(QW_i^Q, KW_i^K, VW_i^V)$. In multi-head attention, the model projects the queries, keys, and values h times with different, learned linear projections. Each of these projected versions of queries, keys, and values are then fed into the attention function in parallel, yielding d_v-dimensional output values. These are concatenated and once again projected, resulting in the final values.

3. Position-wise Feed-Forward Networks:

$$\text{FFN}(x) = \max(0, xW_1 + b_1)W_2 + b_2$$

In addition to attention sub-layers, each of the layers in the Transformer contains a fully connected feed-forward network, which is applied to each position separately and identically.

4. Layer Normalization and Residual Connections: The Transformer uses layer normalization and residual connections to stabilize the learning process. The output of each sub-layer is $\text{LayerNorm}(x+\text{Sublayer}(x))$, where $\text{Sublayer}(x)$ is the function implemented by the sub-layer itself.

5. Positional Encoding: Since the model doesn't use recurrence or convolution, positional encodings are added to give the model information about the relative or absolute position of the tokens in the sequence.

$$PE_{(pos,2i)} = \sin\left(\frac{pos}{10000^{2i/d_{\text{model}}}}\right)$$
$$PE_{(pos,2i+1)} = \cos\left(\frac{pos}{10000^{2i/d_{\text{model}}}}\right)$$

where pos is the position and i is the dimension.