Does Mandatory Expenditure on CSR Affect Firm Value?
Empirical Evidence from Indian Firms

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Abstract

Section 135 of India's Companies Act 2013 makes it mandatory for all Indian firms satisfying certain size or profit based threshold to spend at least 2% of net profit earned in last three preceding years on Corporate Social Responsibility (CSR) from FY 2015 onwards. In the existing empirical literature on CSR in India there is dearth of studies that examine impact of mandatory CSR spending on firm value in a rigorous way. The objective of this paper is to fill this void in the literature. Using firm-level data for the period FY 2006-2016, we examine the impact of mandatory CSR spending on firm value in Indian context. Since the CSR law in its current form is applicable as "comply-or-explain" obligation, we use quasi-experimental methods to control for potential endogeneity of decision to comply with the CSR law starting from FY 2015. We use difference-in-differences combined with matching to estimate the impact of mandatory CSR spending on Tobin's Q as a measure of firm-value. Our results suggest that mandatory CSR spending has a positive and statistically significant impact on firm value and this result is robust to both alternative empirical specifications, and alternative measures of firm value.

Keywords: Corporate Social Responsibility (CSR), firm value, difference-in-differences; matching

JEL Classification: G30; G31

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1 Introduction

In 2013, India became the first country in the world to make it mandatory for firms above certain threshold to spend on CSR. According to Section 135 of Companies Act 2013, firms with net worth exceeding INR 500 crores or net sales over and above INR 1000 crores or profit before tax (PBT) in excess of INR 5 crores should compulsorily spend at least 2 percent of their average net profit earned over the last three preceding years on CSR from FY 2015 onwards (referred as CSR law hereafter). Interestingly, a subsequent study conducted by KPMG finds that Indian firms have committed themselves to spend more than what they are required to spend on CSR as per CSR law in FY 2016.[1]The study also reports that average CSR spending of firms increased approximately by 15 percent during FY 2016 as compared to FY 2015. Hence, it is imperative to ask why do Indian firms spend more than what they are required to spend as per the CSR law. One of the tenable explanations for this could be that spending on CSR actually enhances firm value. However, empirical studies that examine relationship between CSR spending and firm value conducted across countries find mixed results (For example, Margolis et al. (2007); Servaes and Tamayo (2013); Barnea and Rubin (2010)). In other words, whether spending on CSR is a "value-enhancing" or a "value-destroying" activity for firms remains a contentious topic in the existing literature. Against this background, the passage of Companies Act 2013 offers an excellent setting to test the impact of mandatory CSR spending on firm value empirically. Existing studies that examine CSR-firm value relationship in Indian context also report mixed results (Mukherjee and Bird (2016);Sarkar and Sarkar (2015); Manchiraju and Rajgopal (2015);Dharmapala and Khanna (2016)). However, it is pertinent to note here that the CSR law is applicable as "comply-or-explain" obligation for firms during initial two-three years. Therefore, it gives scope for firms above the stipulated thresholds to decide whether they will comply and spend on CSR immediately from FY 2015 or spend on CSR later than FY 2015. In other

[1]The study conducted by KPMG includes top hundred (N100) listed companies as per market capitalization as on Mar 31, 2016. The KPMG study report is available at `https://home.kpmg.com/content/dam/kpmg/campaigns/csr/pdf/CSR_Reporting_2017.pdf` (accessed on 4 Aug 2017)

words, early CSR complying firms could be different from late CSR complying firms due to unobserved heterogeneity. It is also intriguing to find that certain firms who are not affected by the CSR law spend voluntarily on CSR in FY 2015 or later.[2] Therefore, decision to spend on CSR is potentially endogenous and might be governed by several unobserved firm-level characteristics. In the existing empirical literature on CSR in India there is dearth of studies that examine impact of CSR spending on firm value in a rigorous way. This paper fills this void in the relevant literature. Our main objective in this paper is to examine the impact of mandatory CSR spending on firm value after enactment of CSR law. Using firm-level data between FY 2006 and FY 2016 we estimate the impact using difference-in-differences (DiD) combined with propensity score matching (PSM) to address potential endogeneity of decision to spend on CSR.

We contribute to the literature in several ways. First, our results contribute to the existing literature by providing new evidence that informs the debate about the impact of CSR spending on firm value. We find that firms that spend on CSR from FY 2015 or later, on average, generate a higher firm value as compared to similar firms who never spend on CSR during 2006-2016. Therefore, we find evidence in support of CSR being value-enhancing. This positive relationship between CSR spending and firm value is significant both statistically and economically. Our results are robust to other empirical specification such as regression discontinuity design (RDD) and endogenous switching regression that control for potential endogeneity. Second, our results have implications for firms, policymakers, and regulators since each of them have different incentives.

The rest of the paper is organized as follows. Section 2 presents a brief chronological account of the evolution of CSR law in India and how firm performance in terms of CSR activities is being tracked by a leading stock exchange in India to set the context of this paper. Section 3 reviews the related literature on CSR and firm value. Section 4 describes the data and construction of our study sample. Section 5 explains our methodology and

[2]Approximately 7% of our treatment firms belong to this category.

Section 6 discusses the results. Section 7 concludes.

2 Background

In 2009, The Ministry of Corporate Affairs (MCA) initiated "Voluntary Guidelines on Corporate Social Responsibility" in order to motivate firms to undertake CSR activities.[3] In the next year an announcement was made with regard to mandatory CSR spending for firms exceeding certain size thresholds. In 2011, mandatory CSR proposal was incorporated in new Companies Act. Subsequently the bill inclusive of CSR spending was passed in the lower house of Parliament (Lok Sabha) in 2012 and the same was passed in the upper house (Rajya Sabha) of Parliament in India in 2013. Upon Honorable President of India's assent the CSR law came into effect in 2014. In this regard, Section 135 of the Companies Act, 2013 provided CSR provisions and guidelines following which firms must spend on their CSR activities. Section 135 (5) of Companies Act 2013 made it compulsory for all CSR eligible firms to spend at least 2 percent of net profit before tax (PBT) earned during the preceding three FYs on CSR activities from FY 2015.[4] Further, it was notified that firms would not be penalized if they fail to spend on CSR activities as per requirement for the initial two to three years.[5] This relaxation was provided because some firms might need some time to decide on CSR activities and spend accordingly. However, these non-complying firms would have to justify the reasons for not spending on CSR[6] and failing to do so would be punishable under the said law.[7] However, the Companies Act 2013 is silent about the usage of unspent CSR amount by non-complying firms. 'DPE[8] guidelines on CSR and Sustainability' has instructed a non-complying firm to carry forward unspent CSR to the next FY. As a result,

[3]See `http://www.mca.gov.in/Ministry/latestnews/CSR_Voluntary_Guidelines_24dec2009.pdf`

[4]See Ministry of Corporate Affairs Notification issues on 27th February 2014 (Available at `http://www.mca.gov.in/Ministry/pdf/CompaniesActNotification2_2014.pdf`)

[5]These initial two to three years are considered as "learning period" as per the report of High Level Committee, Ministry of Corporate Affairs, Government of India, September 2015, (Available at `http://www.mca.gov.in/Ministry/pdf/HLC_report_05102015.pdf`)

[6]Ibid

[7]Ibid

[8]DPE stands for Department of Public Enterprises

non-complying firms would have to spend more than 2 percent of their net profit on CSR activities in the next year.[9]

The schedule VII of the Companies Act provides a list of areas in which firms can spend under CSR activities. This list includes activities such as eradication of hunger, poverty alleviation, improvement in education, reducing gender inequality, promoting environmental sustainability and so on.[10] The list provides firms liberty to prioritize certain areas and spend accordingly as CSR.

Like Ministry of Corporate Affairs, stock exchanges can also play an active role in promoting investment in CSR by Indian firms. In this regard, Bombay Stock Exchange (BSE) and the Indian Institute of Corporate Affairs (IICA) jointly develop a CSR index.[11] Further, BSE has also launched a Green Index called Greenex ,[12] to track the performance of Indian firms in terms of carbon emissions. This motivates firms to be more energy-efficient, and as a result they can be a part of this index. During its pilot runs, BSE finds that Greenex provide better returns to investors as compared to the returns of Sensex.[13] This result implies that investors are willing to pay premium to firms that are both energy efficient and profitable.

3 Review of literature

CSR is one of the important activities of firms across the world. According to UN Global Compact-Accenture (2010), 93 percent of CEOs perceive CSR as either 'important' or 'very

[9]Ibid

[10]See the report of High Level Committee, Ministry of Corporate Affairs, Government of India, September 2015, Annexure II: Schedule VII of the Act and amendments made thereafter section, p.no 35 (Available at http://www.mca.gov.in/Ministry/pdf/HLC_report_05102015.pdf)(Accessed on 24th January, 2016)

[11]This index measures the performance of firms in terms of mandatory spending on CSR activities. BSE listed firms have been advised to disclose their spending on CSR on their own websites and MCA websites. This index helps those investors who are willing to invest in socially responsible businesses (Available at http://www.businesstoday.in/current/corporate/bse-iica-to-launch-corporate-social-responsibility-index/story/198856.html)

[12]This index comprises of 20 stocks and is measured in terms of carbon emissions (Available at https://economictimes.indiatimes.com/bse-launches-indias-first-carbon-efficient-live-index-called-greenex/printarticle/12038414.cms)

[13]Ibid

important' for firms' success.[14] Similarly, 94 percent of Business Week 1,000 US firms are of the view that CSR adds value by delivering business benefits to them (Grant et al. (2002)). In the related literature, there are two contrasting theories that explain the relationship between CSR and firm performance. The first strand of literature suggests that spending on CSR helps firms to increase their operating performance and shareholder's value.[15] For example, according to 'stakeholder's theory' as proposed by Freeman (1984), who argues that firms should focus on taking care of interests of both shareholders and stakeholders since each of them contributes to firms' success. In the context of CSR, Jones (1995) finds that CSR initiatives undertaken by firms help various stakeholders which indirectly benefits shareholders. He justifies this argument on the grounds that the ultimate objective of firms is to maximize shareholders' wealth, which is attained by satisfying various other stakeholders. This is termed as "instrumental stakeholder theory". Galema et al. (2008) argue that firms that engage in CSR activities have lower book-to-market ratios as compared to firms that do not engage in CSR activities, and hence these firms are more likely to have higher firm value.[16] Some more supportive evidence is provided by Servaes and Tamayo (2013), who find a positive relation between CSR spending firms with high customer awareness and firm value.[17] However, this relationship disappears for CSR firms with low customer awareness. In a similar study, Gillan et al. (2010) find that CSR firms are more likely to have lower operating expenses and therefore have higher return on assets (ROA).

There are other empirical studies that examine the channels through which CSR creates value to firms. For example, firms that involve in CSR activities are able to achieve higher sales growth by widening customer base since CSR spending helps firms in enhanc-

[14]Percentage of CEOs who participated in the study.

[15]In the related literature, operating performance is measured by return on assets (ROA), return on equity (ROE), and net profit ratio. To measure firm value, researchers employ Tobin's Q ratio.

[16]Firms with lower book-to-market ratios are more likely to have higher earnings, lower leverage in capital structure, and lower uncertainty in earnings as compared to the firms that have higher book-to-market ratios ((Fama and French, 1995)). These firms also have lower financial distress costs as argued by (Fama and French, 1996). Hence, investors typically expect lower returns from these stocks.

[17]The authors use firm's spending on advertisement expenses as a proxy for customer awareness.

ing their reputation[18](Reinhardt (1998); McWilliams and Siegel (2001); Baron (2008)) and may attract new customers (Russo and Fouts (1997); Flammer (2014)).[19] CSR spending can also result in higher employee satisfaction since these firms are able to attract, retain, and motivate employees (Albinger and Freeman (2000); Peterson (2004); Flammer (2015)). CSR spending firms are also more likely to use environment-friendly green technology and thereby enjoy financial benefits (Clelland and Douglas (2000); Russo and Harrison (2005)). Albuquerque et al. (2017) conclude that CSR firms enjoy lower cost of equity as compared to non-CSR firms since the former is more likely to have lower systematic risk as compared to the latter. This result is justifiable since the profitability of CSR firms is less sensitive to business cycle fluctuations as compared to non-CSR firms. Firms that engage in CSR activities have lower costs related to financial distress (Goss (2009)), lower cost of capital (El Ghoul et al. (2011)), better access to capital (Cheng and Serafeim (2014)), and lower cash holdings (Cheung (2016)).[20] By employing quasi experiment, Flammer (2015) finds that firms that adopt "close call CSR proposal" generate higher shareholders value as compared to firms that do not employ CSR based on the same. Further, the author finds that the labor productivity and sales growth are the two major channels through which CSR affects shareholders value. Margolis et al. (2007) employ meta-analysis by collating the findings of different empirical studies. They find that the coefficient of CSR variable is positive and statistically significant, which implies that firms that spend on CSR tend to have higher firm value. However, the magnitude of the CSR coefficient is small. Lys et al. (2015) argue that firms may spend on CSR in the current year in anticipation of a better financial performance in the following year. In other words, firms may "signal" strong future performance to investors by spending on CSR and this is known as "signaling" hypothesis. Using a large

[18]This is known as "resource based theory" in the related literature.

[19]For example, purchase of "Green" electricity has substantially increased in India since 2010. More number of consumers prefers to buy "energy-saving television" and "energy-efficient refrigerator" in India, and this number has been increasing from 2008. (Available at `http://images.nationalgeographic.com/wpf/media-content/file/NGS_2012_Final_Global_report_Jul20-cb1343059672.pdf`)

[20](Cheung, 2016) concludes that the investors' preference and customers' loyalty are higher in case of CSR firms as compared to non-CSR firms. As a result, the former tends to have lower systematic risk than the latter which may result in decrease in cash holdings for CSR firms.

dataset on CSR across 53 countries for a period between 2003 and 2010, El Ghoul et al. (2017) find a positive association between firm's CSR activities and its firm value in case of those countries where the market institutions are weak.

The second strand of literature advocates that CSR activities of firms cause reduction in shareholder's wealth (Friedman (1970);Jensen and Meckling (1976);Barnea and Rubin (2010); Cheng et al. (2016); Masulis and Reza (2015); and Reinhardt et al. (2008)). Friedman (1970) argues that the sole objective of any firm is maximization of both profits and shareholder's value. Therefore, spending on CSR by firms adversely affects firm value. Further, he believes that spending on welfare of the society is the responsibility of the government and not of the firms. Some firms engage in CSR activities although it does not benefit them since the managers of these firms prefer to maintain overly good relationship with its different stakeholders such as shareholders, customers, suppliers, etc.(Jensen and Meckling, 1976). A few studies also conclude that conclude that CSR investments by firms may lead to agency problems between managers and shareholders. For example, Barnea and Rubin (2010) argue that managers earn good reputation through CSR investments at the cost of shareholders' interest. Cheng et al. (2016) find that the likelihood of investing in CSR by firms reduces if managers in these firms hold a substantial ownership. This result implies that managers are less interested in CSR activities if their personal wealth is invested in the firm. Masulis and Reza (2015) find that CEOs transfer firms' resources to those charitable institutions that are owned by them in the name of CSR. This result suggests that CEOs make personal gains at the cost of firms. Reinhardt et al. (2008) argue that if markets do not reward those firms that invest in CSR, then such a strategy may not result in automatic increase in shareholders' value.

In the existing literature, there are a few empirical studies done in the context of India which are worth noting (Bansal and Rai (2014); Sarkar and Sarkar (2015); Mukherjee and Bird (2016); Dharmapala and Khanna (2016); Manchiraju and Rajgopal (2015)). Bansal and

Rai (2014) find a positive correlation between firms' CSR spending and profitability.[21] In a similar study, Sarkar and Sarkar (2015) find impact of CSR on both firm value and firm's profitability is positive. In a survey based study, Mukherjee and Bird (2016) report that 91.9 percent of CSR spender firms who are affected by the CSR law believe that spending on CSR helps them to increase their profitability.[22] This is justifiable on the grounds that spending on CSR by firms helps them to improve both firm's image and its relationship with the government and the community. However, it is surprising to find that cent percent of unaffected CSR spender firms also consider allocating money to CSR activities enhances their profitability. These firms predominantly derive benefit in the form of higher employee productivity. Dharmapala and Khanna (2016) examine the impact of Section 135 on firm's spending on CSR. They find that affected firms which have been spending less than 2 percent increase their CSR spending, and firms which have been spending more than 2 percent reduce their CSR expenditure after the passage of the law. They also find that firms which have to spend on CSR activities due to Section 135 spend less on advertising expenses, which they term as "substitution effect".[23] Manchiraju and Rajgopal (2015) find that firms' stock price has declined after the enactment of CSR law. The authors employ different identification strategies to check validity of their results. They find qualitatively similar results under different strategies adopted and hence their results are robust. Similar results are also reported by Dharmapala and Khanna (2016). Moreover, anecdotal evidence suggests that spending on CSR by Indian firms is an indirect way of imposing taxes on them.[24]

[21] The authors argue that firm's spending on CSR helps to increase profits due to two reasons. First, through CSR spending these firms can differentiate their products from that of their competitors in the market. Second, firms that belong to environmentally polluting industry are less likely to face protests from local communities and government regulators because of their involvement in improvement of environmental quality and social good. They further argue that the extent of spending on CSR increases with firm size.

[22] The authors conduct a survey of 223 Indian firms for the period between November 2014 and January 2015.

[23] "Substitution effect" refers to reduced spending on advertisement expenses by affected firms after CSR law becomes effective.

[24] According to a global tax survey conducted by KPMG in 2015 the corporate tax rate of India was 34.61 percent in 2015, which is much higher than the global average of 23.68 percent. Therefore, mandating Indian firms to invest at least 2 percent of their profits on CSR reduces their competitiveness in the global market. Refer to `http://www.livemint.com/Opinion/1wIQwFPRyRckBMg5IugW1K/Why-the-CSR-law-is-not-a-success.html`

4 Data and sample construction

In this paper, we consider all National Stock Exchange (NSE) listed-firms for the period between FY 2006 [25]and FY 2016. We consider only those firms that disclose their financial data as on 31^{st} March every year. The data related to financial statement variables, firm's share prices, and CSR variables are collected from ProwessIQ database.[26] We also exclude those firms that report negative net worth in a particular FY.[27] We compute the main variable of our interest, firm's spending on CSR, as the sum of "social and community expenses" and "environmental and pollution control related expenses".[28] Following Dharmapala and Khanna (2016), we also assume missing observations of our CSR proxy variable as zero.[29] We also replace missing values of advertising expenses with zero which is a standard practice adopted by other studies (Black and Kim (2012);Servaes and Tamayo (2013)).

Our initial sample consists of 1,682 firms. We classify these firms into four categories (see Table 1). The first category includes those firms which spend on CSR every year between FY 2006 and FY 2016. Firms which never spend on CSR between FY 2006 and FY 2016 are classified into the second category (CSR non-spender group). The third category includes those firms which spend on CSR in certain years between FY 2006 and FY 2014. In the fourth category, we consider those firms that spend for the first time on CSR in FY 2015 or later (CSR-spender). We have in total 26, 781, 206 and 669 firms in category 1, 2, 3 and 4 respectively. Across these categories we have firms which are above (below) the thresholds

[25]Sarkar and Sarkar (2015) examine the firms that undertake CSR activities over the period between FY 2003 and FY 2011, and find that more than 25 percent of Indian firms spend on CSR from FY 2006. However, it is lower than 25 percent for the years prior to 2006. Therefore, we start our analysis from 2006 onwards.

[26]This database is maintained by Centre for Monitoring the Indian Economy (CMIE), and is widely used in the literature in the Indian context (see Khanna and Palepu (2000))

[27]While examining the impact of board structure on firm value, Black and Kim (2012) also exclude firms that have book value of equity less than zero.

[28]The same proxy for CSR expenditure is used by Dharmapala and Khanna (2016).

[29]Prowess database provides firm-level data on CSR expenses (amount spent on CSR activities during the year) only from FY 2015 onwards. We also verify accuracy of our CSR expenditure proxy by comparing it with the corresponding CSR expenditure figures available from Prowess. We find that in 88% cases our CSR expenditure proxy tallies well with CSR expenditure provided by Prowess. This lends further credence to our CSR expenditure proxy.

Table 1: Sample composition

Categories	Affected	Unaffected	Total
1. No.of firms who spent on CSR every year between 2006 and 2016	25	1	26
2. No of firms who never spent on CSR between 2006 and 2016 (CSR Non-spender group)	249	532	781
3. No of firms who spent on CSR in certain years between 2006 and 2014	165	41	206
4. No.of firms who spent on CSR only from 2015 onwards (CSR Spender group)	617	52	669
Total	1056	626	1682

Note: Affected category includes firms with either net worth or sales or profit before tax (PBT) in FY 2015 exceeding their respective thresholds stipulated under Section 135 of Companies Act 2013. Unaffected category includes firms with net worth, net sales and PBT below thresholds stipulated in Section 135 of Companies Act 2013. All firms having negative net worth are dropped from the sample. Only firms reporting as on March 31 are included in the sample.

stipulated under CSR law in FY 2015 and we term them as "affected" ("unaffected"). Thus, we have 1,056 and 626 firms in total in affected and unaffected categories respectively. In our analysis, we include only the CSR spender and CSR non-spender firms as discussed in the following section since the focus of this paper is to examine the impact of mandatory CSR on firm value. We winsorize all accounting ratios except Tobin's Q used in the analysis at 1^{st} and 99^{th} percentile. This helps us to mitigate the impact of outliers.

5 Methodology

We exploit firms belonging to CSR spender and CSR non-spender groups for identification. Following the convention of evaluation literature we call the first group treatment and the second control.[30] Thus, from Table 1 it is evident that our treatment group consists of 669 firms and the control group consists of 781 firms. Both the groups include both affected and non-affected firms as defined in Section 4 (see Table 1). The CSR law as per Companies Act 2013 is currently in "comply or explain" form and hence there is scope for a typical firm above the stipulated thresholds to decide whether it will comply immediately i.e. from FY 2015 or undertake CSR activities later than FY 2015. In other words, our classification of

[30]We use CSR spender for treatment and CSR non-spender for control interchangeably in this paper.

treatment and control group could be potentially endogenous since CSR spending even by affected firms from FY 2015 or later is discretionary in nature.[31] Moreover, from Table 1 we can see that 52 unaffected firms also spend on CSR from FY 2015 onwards. Therefore, we adopt quasi-experimental methods such as propensity score matching (PSM) and difference-in-differences (DiD) as identification strategies to estimate the impact of mandatory CSR spending on firm value.

5.1 *PSM based on observable characteristics*

First, we estimate the average treatment effect on the treated (ATOT) using propensity score matching (PSM). We briefly discuss here the key steps involved in PSM. First, we identify a set of observable firm-level pre-treatment (prior to 2015) characteristics to estimate propensity score (probability) for each firm to select into treatment group. We use four firm-level pre-treatment variables for PSM: log of total assets (proxy for size), advertisement intensity, cash ratio as a proxy for liquidity, and leverage as a proxy for financial distress costs for FY 2006.[32] The description of these variables is provided in Table 2. We use 2006 variables for two reasons. First, these variables measured in FY 2006 are purely pre-treatment since those are not affected by the mandatory CSR law of 2013. Second, in our dataset FY 2006 is the beginning year during which no discussion happened on mandatory CSR expenses in the policy circle. Second, for carrying out PSM we retain firm year observations only for FY 2016 which is a post-treatment year (after mandatory CSR law became effective). A propensity score (estimated probability) of falling into treatment group for each firm is computed using Logit model. Third, firms belonging to treatment group are matched (closest propensity score) with firms belonging to control group using the propensity scores. Thus, two matched firms are equally likely to belong to treatment group and hence their actual selection into either group is purely random. We use two algorithms to

[31] Financial year (FY) for most Indian firms starts on April 1 of the current year and ends on March 31 next year.

[32] We winsorize the following variables at their 1^{st} and 99^{th} percentiles to account for possible outliers: advertisement intensity, cash ratio, and leverage.

match firms namely, nearest-neighbor (NN) and kernel based matching. Finally, average of outcomes of the two groups so matched is compared to estimate the impact of the treatment in question (in our case the mandatory CSR law).[33] Under NN matching, we use five nearest neighboring firms from control group for each firm from treatment group and it is done with replacement.[34] We report bias-corrected standard error of the impact estimate under NN as suggested by Abadie and Imbens (2011). For kernel based matching we compute standard error of the same using bootstrap (Efron and Tibshirani (1993)). We also use regression based method by exploiting the propensity scores as weights.[35]

Table 2: Definition of the variables

Variables	**Definition of the variable**
Tobin's Q	Ratio between book value of total assets minus book value of equity plus market value of equity and book value of total assets
ROA	Ratio of profit before depreciation, interest, tax, and amortization to average total assets
log (total assets)	Natural logarithm of total assets
advertisement intensity	Ratio of advertising expenses to sales
cash ratio	Ratio of Cash and bank balance to total assets
leverage ratio	Ratio of total borrowing to total assets
selling intensity	Ratio of selling and distribution expenses to sales
efficiency	Ratio of cost of goods sold to sales, as defined by Servaes and Tamayo (2013)
capital spending	Ratio of capital expenditure to sales, as defined by Servaes and Tamayo (2013). The capital expenditure is defined by change in gross fixed assets

The validity of PSM impact estimates rests on two crucial assumptions. First, selection into treatment group is entirely determined by observed characteristics. In impact evaluation literature this assumption is known as "conditional independence" (Khandker et al.

[33]Firms for which no matching firm is found are dropped from the analysis (Khandker et al. (2010)).
[34]Thus, a control firm can be matched with more than one treatment firm.
[35]Regression with propensity scores as weights provides more efficient estimates. (Khandker et al. (2010))

(2010)).[36] Second, distributions of the propensity scores of the two groups have sufficient overlaps. This assumption is known as "common support" which implies that post matching treatment and control groups should be similar on an average in terms of observed characteristics. This average similarity of the two matched groups in terms of observed characteristics is called "balancing". We test both the assumptions empirically for our study sample. Since the assumption of "conditional independence" is not directly testable we conduct a test suggested by Rosenbaum (2010). This test assesses the sensitivity of the PSM impact estimate to violation of the underlying assumption of "conditional independence". We test the assumption of "common support" and hence "balancing" using graphs and mean tests across two groups respectively.

5.2 *Difference-in-differences with matching*

As mentioned in the previous section PSM impact estimates are invalid in the presence of selection on unobserved firm-level characteristics. Therefore, we combine PSM with difference-in-differences (DiD) to account for both selection on observable and time-invariant unobserved heterogeneity. We do this in two steps. As the first step, we first perform PSM based on pre-treatment firm characteristics described in Section 5.1. In the second stage, we use the firms falling within the common support of PSM to estimate the impact of the treatment using DiD. For DiD, we consider data for FY 2006-2014 as pre-treatment period ($t = 0$) and data for FY 2015 and 2016 as post-treatment period ($t = 1$). The basic idea behind DiD is to compute the difference in average outcome of treatment and control groups both in pre and post treatment periods and compare these differences across two time periods ($t = 0, 1$) to estimate the impact of the treatment. We estimate the following regression equation:

$$log\left(Tobin's\ Q\right)_{it} = \delta D_{it} + x_{it}\gamma + \alpha_i + \lambda_t + \epsilon_{it} \tag{1}$$

[36] Conditional independence is a fairly strong assumption defined in terms of potential outcomes and hence often researchers rely on a weaker version of it defined in average terms. This weaker assumption is known as conditional mean independence (Cerulli (2015)).

Based on survey of existing literature on firm value and its determinants we use log of Tobin's Q as a measure of firm value (outcome variable).[37] D_{it} takes the value 1 if the i^{th} firm belongs to treatment group in year t and equals zero otherwise. x_{it} is a vector of time varying firm-level controls which includes log of total assets (a measure of firm size), advertisement intensity, cash ratio (a proxy for liquidity) and leverage (a proxy for firms' financial distress costs).[38] For the rationale behind inclusion of these controls we refer to the existing body of literature on firm value (Manchiraju and Rajgopal (2015); Flammer (2015)). In Eqn 1, α and λ denote firm and year fixed effects respectively. Our coefficient of interest is δ which is an estimator of the treatment effect. We estimate Eqn1 using ordinary least square and estimate standard errors clustered at the firm-level. Following Hirano et al. (2003), we also use propensity scores obtained from PSM as weights to get efficient impact estimate.

The validity of DiD estimator critically hinges on the assumption of parallel trend. It implies that there is no difference in the trend in firm value (Tobin's Q) across treatment and control group prior to the enactment of CSR law 2013. We specifically test this assumption by restricting our sample to the time period between FY 2006 and FY 2010 for all the firms. Further, we hypothetically consider FY 2008 as the year of enactment of CSR law and estimate Eqn1 for the reduced time period FY 2006-2010. This strategy is akin to conduct a placebo trial. The rationale behind this test is that in the absence of any true CSR policy change during FY 2006-2010 firm-value across treatment and control groups should exhibit similar trends. In other words, the coefficient interest, δ, in Eqn 1 should be statistically insignificant.

[37]We also try log of price-to-book ratio as an alternative proxy for firm value and obtain qualitatively similar results. Use of winsorized Tobin's Q instead of log of Tobin's Q also produce similar results. Further, we test the robustness of our results using future Tobin's Q (Tobin' Q at year $t+1$) as the dependent variable and find similar results (results are available upon request).

[38]We also estimate the same regression using sales as an alternative proxy for size and obtain qualitatively similar results.

5.3 *Robustness*

We carry out a number of tests to check robustness of our DiD combined with PSM estimation results. First, we estimate Eqn 1 using only DiD without any matching. Second, following Servaes and Tamayo (2013) we include a few more controls in our baseline regression Eqn 1: selling intensity, efficiency and capital spending. We measure selling intensity by the total of general, selling and administrative expenses scaled by sales. We also measure efficiency of firms by costs of goods sold as a proportion of sales. The rationale for this measure is that firms with higher cost of goods sold to sales ratio tend to be less efficient. In other words, there is an inverse relationship between efficiency and cost of goods sold for two firms having same sales. To capture investments by firms we measure capital spending as change in gross fixed assets scaled by sales. Third, we estimate Eqn 1 with return on assets (ROA) as the dependent variable. Tobin's Q being a long term measure of firm value fails to capture short term impact, if any, of CSR spending (Servaes and Tamayo (2013)). Therefore, we use ROA as a short term proxy for firm's profitability which indirectly influences firm value in the long run. Fourth, following Bertrand et al. (2004) we also test robustness of our DiD results using randomization inference method. Since DiD method exploits multi period data, estimated standard errors might suffer from problem of serial correlation. Hence, Bertrand et al. (2004) suggest an alternative technique for computing standard error using simulations. DiD estimates are computed for a large number of "placebo" trials using simulated data. To explicate further, a "placebo" trial is a hypothetical policy change (in our case the CSR Act) introduced in the empirical model. This enables us to generate the distribution of the null hypothesis of no treatment effect of the CSR law. In particular, we observe whether the original impact estimate lies within the 2.5^{th} percentile (lower limit) and 97.5^{th} percentile (upper limit) interval to gauge its statistical significance using two-tailed test at the 5% level. If the original DiD impact estimate falls outside the interval computed previously, we reject the null of zero treatment effect. Fifth, selection into treatment group could also be driven by time-varying unobserved firm characteristics. To control for such potential endogeneity

we estimate the following endogenous switching regression equation:[39]

$$\begin{aligned} log\,(Tobin's\,Q) = \beta_0 + \beta_1 treatment\,dummy_{it} + \beta_2 affected\,dummy_{it} \\ + \beta_3 treatment\,dummy \times affected\,dummy_{it} + \beta_4 log(totalassets)_{it} \\ + \beta_5 advertisement\,intensity_{it} + \beta_6 cash\,ratio_{it} + \beta_7 leverage_{it} \\ + \beta_8 advertisement\,intensity \times treatment\,dummy_{it} + year\,dummies + u_{it} \end{aligned} \tag{2}$$

Following Maddala (1983) we can assume that "sample separation" of treatment and control group is known and outcome variable (log of Tobin's Q) follow two different regimes in terms of "probability laws" with correlated errors across two groups and the error term from the selection equation (*treatment dummy*).[40] In Eqn 2, *treatment dummy* is an endogenous dummy variable which takes the value unity if i^{th} firm has spent on CSR for the first time in FY 2015 or later and takes the value zero for all firms who have never spent on CSR between FY 2006 and FY 2016. In the same regression specification we include a dummy for firms (*affected dummy*) who are above either of the thresholds stipulated in terms of net worth (INR 500 crores and above), net sales (INR 1000 crores and above) or PBT (INR 5 crores and above) as per CSR law. Following Servaes and Tamayo (2013) we also introduce interaction between *advertisement intensity* and *treatment dummy* to account for greater customer awareness induced through increased spending on advertisement. The coefficient of interest is β_1 which measures ATOT. We estimate Eqn 2 using full information maximum likelihood (FIML). We use post treatment data for FY 2015 and 2016 for both treatment and control groups. Keeping in mind the primary objective of this paper and for the sake of brevity, we report only the estimation results of the outcome (Tobin's Q) equation.[41]

[39]We do not employ firm fixed effects due to two reasons. First, maximum likelihood estimators may not be consistent due to incidental parameter problem. Second, the usage of panel fixed effects results in substantial loss of information if *treatment dummy* (i.e., our main variable of interest) does not vary much with time (Cheung (2016); Guenster et al. (2011))

[40]For the sake of brevity we do not specify the selection equation explicitly in this paper. The selection equation (*treatment dummy*) is estimated using Logit with the following determinants: net worth, sales, PBT, log of total assets, advertisement intensity, cash ratio, and leverage.

[41]In the endogenous switching regression model in the first stage we estimate the selection equation for *treatment dummy* using Logit. The Logit estimation results are not of our primary interest and hence we

Finally, we also estimate the impact of CSR on firm value under a regression discontinuity design (RDD). The CSR law as per Companies Act 2013 makes it mandatory for firms above certain threshold to spend on CSR and hence RDD become feasible. Because we find PBT threshold (INR 5 crores) is binding for majority of firms in India we exploit it for our RDD.[42] The basic idea behind RDD is that firms just below the threshold and the firms just above the threshold are otherwise very much similar in terms of most of the firm-level characteristics except for the expenditure on CSR and hence any difference observed in firm-value between above threshold and below threshold firms is purely attributable to treatment (i.e. spending on CSR after enactment of CSR law 2013).[43] Following Cerulli (2015) we estimate a regression using pooled OLS with year fixed effects as follows:

$$\begin{aligned} log\,(Tobin's\,Q) = \beta_0 + \beta_1 treatment\,dummy_{it} + \beta_2 deviation\_threshold_{it} \\ +\beta_3 treatment\,dummy \times deviation\_threshold_{it} + year\,dummies + \epsilon_{it} \end{aligned} \tag{3}$$

In the above equation *treatment dummy* takes value 1 for firms above the stipulated PBT threshold (INR 5 crores) and zero otherwise in a particular FY. The variable *deviation_threshold* is the difference between PBT of i^{th} firm in year t and the PBT threshold. In Eqn 3, β_1 is the coefficient of interest which is an estimator of ATOT. We use post-treatment data pertaining to FY 2015 and 2016 to estimate Eqn 3.

6 Results

6.1 *Summary statistics*

Table 3 presents the summary statistics of the main variables used in this paper. The sample consists of 13381 firm year observations of which 6703 and 6678 observations are

are not reporting the same in this paper.

[42]This finding is in line with Dharmapala and Khanna (2016).

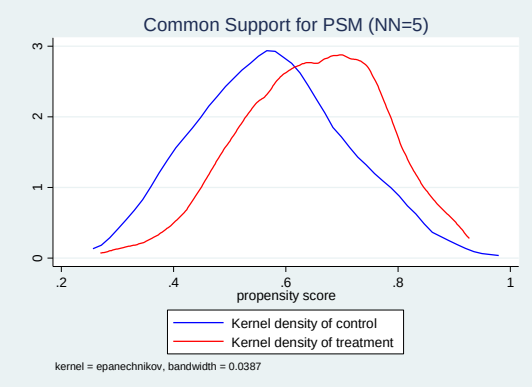
[43]However, we should bear in mind that though all the firms above the threshold are required to spend on CSR, not all of them actually spend on CSR (non-complying firms). These non-complying firms are required to explain the reasons for not spending on CSR as per the CSR law.

from treatment and control groups respectively. The table shows that mean (1.775) Tobin's Q of treatment firms spending on CSR is greater than that of CSR non-spending firms (1.255) belonging to control group and the difference (0.520) is statistically significant at the 1 percent level of significance. The same is true if we compare the two groups in terms of median.[44] We also find that Tobin's Q is skewed to the right (median is less than mean) for both the groups and for the full sample. [45] The mean total asset in log terms of treatment firms (6.589) is also higher compared to that of control firms (5.830) and the difference (0.759) is statistically significant at the 1 percent level. In other words, larger firms are more likely to spend on CSR. Treatment firms also tend to have higher advertisement intensity. The difference (0.006) between mean advertisement intensity of CSR spenders (0.014) and that of CSR non-spenders (0.008) is statistically significant at the 1 percent level. This result is consistent with the findings of Servaes and Tamayo (2013) that firm's CSR expenditure positively impacts firm value if the firm also spends on advertisement which increases customer awareness about the firm including its 'corporate social performance'. The mean cash ratio of CSR spending firms (0.067) exceeds that of CSR non-spending firms (0.060) with the difference (0.007) being statistically significant at the 1 percent level. This result suggests that firms with higher liquidity tend to spend on CSR. This result is in line with the results of other studies (Goss (2009); Lys et al. (2015)). We also find statistically significant difference (-0.012) between treatment firms and control firms in terms of leverage as a proxy for financial distress costs. This result implies lower financial distress costs enable firms to spend on CSR. We find that treatment firms have higher mean selling intensity (0.066) in comparison to control firms (0.045) and the difference (0.021) is also statistically significant at the 1 percent level. Interestingly, we find that the treatment firms (0.864) are more efficient compared to control firms (0.944) and the difference is also statistically significant at the 1% level. The table shows that treatment firms also have higher capital

[44]We report Mann-Whitney-Wilcoxon test for difference in median in Table 3.

[45]Hence, in our empirical model we use log of Tobin's Q as done in other studies (Black and Kim (2012);Manchiraju and Rajgopal (2015))

Figure 1: Kernel density plots of propensity scores for firms across treatment and control



Note: Graphs show propensity scores generated using nearest neighbor matching with five nearest matches (NN=5).

spending compared to control firms and the difference in means is statistically significant at the 10 percent level. This result implies that firms with higher investment in fixed assets are more likely to invest in CSR due to possibility of earning higher cash flow in future (Servaes and Tamayo, 2013).

6.2 *Matching results*

Before getting into the results of PSM we discuss the results of testing the underlying assumptions discussed in Section 5.1. From Figure 1 it is evident that the distributions of propensity scores across treatment and control groups have overlapping regions and hence the 'common support' assumption is vindicated. Therefore, PSM is feasible. Further, Table 4 shows the results of balancing test for the firms matched using NN algorithm. In total 435 treatment firms are matched with 265 firms from control group. Looking at the results we find that all the t-stats corresponding to the observed firm-level characteristics for FY 2006 are statistically insignificant. This result implies that the matched treatment and control groups are indeed similar in terms of average observable characteristics during baseline year 2006.

Table 5 reports the results of PSM under alternative matching algorithms. From Table 5

Table 3: Summary statistics of the sample firms between 2006 and 2016 (across firm years)

	1. Treatment		**2. Control**		**3. Full sample**		**4. Diff=1-2**	
Variables	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Tobin's Q	1.775	1.215	1.255	0.971	1.526	1.044	0.520***	0.244***
log (total assets)	6.589	6.475	5.830	5.640	6.210	6.115	0.759***	0.836***
advertisement intensity	0.014	0.000	0.008	0.000	0.012	0.000	0.006***	0.000***
cash ratio	0.067	0.029	0.060	0.024	0.063	0.026	0.007***	0.004***
leverage	0.293	0.280	0.305	0.293	0.299	0.286	-0.012***	-0.014***
selling intensity	0.066	0.034	0.045	0.021	0.056	0.028	0.021***	0.013***
efficiency	0.864	0.719	0.944	0.783	0.902	0.747	-0.080***	-0.063***
capital spending	0.098	0.035	0.087	0.022	0.093	0.029	0.011*	0.013***
N	6703		6678		13381			

Note: Treatment group includes all firms who spent on CSR for the first time in FY 2015 or later. Control group includes firms who never spent on CSR between FY 2006 and FY 2016. Advertisement intensity, cash ratio, leverage, selling intensity, efficiency, and capital spending have been winsorized at 1%. Statistical significance of difference in mean test (t-test) and median test (Mann-Whitney-Wilcoxon test) are indicated using "*" in column 4. ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

Table 4: Test of balance for observed covariates used in PSM

Variables	**1. Treatment**	**2. Control**	**3. Mean test (t-stat)**
log (total assets)	5.779	5.788	-0.09
advertisement intensity	0.011	0.009	0.88
cash ratio	0.067	0.066	0.26
leverage	0.298	0.299	-0.11
N	435	265	

Note: All variables are measured for FY 2006 (Baseline year). Difference in means test results are reported in column 3. All results are generated using NN with five nearest matches (NN=5) using post-treatment data for FY 2016 only.

we find that estimate of ATOT is positive and statistically significant at the 1 percent level under NN (0.28), kernel based matching (0.30), and regression based method (0.29). The impact estimates are also economically significant. For example, the NN estimate suggests that mandatory CSR spending does have a significant impact on Tobin's Q since treatment firms on an average enjoy 28 percent higher Tobin's Q compared to that of matched control firms. In this regard, Dharmapala and Khanna (2016) interpret the findings of Flammer (2015) in their paper and report that as more number of firms starts spending on CSR which may result in increase in firm value due to network effects. This result is tenable in the Indian context since a large number of certain firms spend on CSR due to mandatory CSR law.[46]

[46]For example, Sarkar and Sarkar (2015) examine the voluntary disclosures and adoptions on CSR by top 500 listed Indian firms for a period between 2003 and 2011. They find the percentage of firms that adopt CSR is 7.53 percent in 2003, and this percentage gradually increases year after year and reaches to highest level of 62.18 percent in 2011 during their study period. The number of firms that engage in CSR activities may increase from the financial year 2015 onwards due to mandatory CSR law.

Table 5: Average treatment effect on the treated firms (ATOT) using PSM

	(1)	(2)	(3)
	NN (=5)	Kernel	Regression
ATOT	0.28***	0.30***	0.29***
	(0.062)	(0.053)	(0.052)

Note: Data for only post-treatment FY 2016 is used. NN (=5) signifies nearest neighbor matching using five nearest neighbors. Column 1 presents average treatment effect on the treated (ATOT) under matching with NN(=5). In column 1, Abadie and Imbens (2011) standard error obtained using "teffect" command in Stata is reported in parentheses. Column 2 reports ATOT estimate under kernel based matching. In column 2 bootstrap standard error is reported in parentheses. Column 3 shows ATOT under regression method using propensity scores as weights.In column 3 heteroskedasticity robust standard error clustered at the firm-level is reported in parentheses.

We report the results of Rosenbaum (2010) in Table 6. Panel A of the table shows that PSM estimates are statistically significant up to a value of Γ equal to 2 at the 5 percent level. $\Gamma = 2$ implies that due to some unobserved factor, a treatment firm is twice as likely as a matched control firm to spend on CSR. This is a rather unlikely situation to occur in reality. Hence, our PSM impact estimates are not completely unreliable. One of the important limitations of PSM is that it cannot control for unobserved firm-level characteristics which might be correlated with selection into treatment group. In other words, conditional independence assumption is violated when selection on unobserved firm-level characteristics exists. Unobserved firm-level characteristics can be of two types: time-invariant and time varying. We address both of these using different estimation techniques which are discussed briefly in the following sections.

Table 6: Sensitivity analysis of PSM and robustness of impact estimate under DID combined with PSM

Panel A: Rosenbaum (2010) approach for PSM

Gamma	Sig+	Sig-	CI+	CI-
1	0	0	0.231	0.345
1.25	0	0	0.164	0.415
1.5	0	0	0.108	0.473
1.75	0.0002	0	0.063	0.522
2	0.008	0	0.025	0.566

Panel B: Randomization inference with a =0.05

ATOT	lower limit	Upper limit
0.106	-0.028	0.028

Note: Panel A reports sensitivity analysis results for PSM (NN=5) using Rosenbaum (2010) test. Panel B reports sensitivity analysis results for DID with PSM using randomization inference aka Bertrand et al. (2004).

6.3 *Matching combined with DiD results*

In Table 7 we report the impact estimates of mandatory CSR spending on firm value obtained from different econometric techniques. Column 1 presents the estimation results of DiD combined with PSM. The coefficient of the treatment dummy is positive and statistically significant at the 1 percent level. It is also economically significant. The result suggests that treatment firms on an average have 10.6 percent higher Tobin's Q compared to control firms. [47] A corroborating evidence is provided by Sarkar and Sarkar (2015), who finds a positive association between CSR and firm value. We also find that coefficient of cash ratio is positive and significant at the 1 percent level. To explicate, other firm-level characteristics remaining constant firms having higher liquidity also enjoy higher Tobin's Q. Our results show that leverage has a negative and statistically significant impact on firm-value (Tobin's Q). Firms

[47] To check whether this result is driven by CSR spending by treatment firms unaffected by the CSR law of 2013 we drop these firms from the sample and estimate Eqn 1. We obtain qualitatively similar results.

having higher financial distress costs are expected to have lower firm-value. These results are consistent with the existing literature. [48] However, we find that firm size measured by log of total assets does not matter for firm value when DiD is combined with PSM although its coefficient is negative and statistically significant under simple DiD (see column 4). This is because we also use firm size for matching firms under PSM and hence post matching it has very little explanatory power as far as variation in Tobin's Q is concerned. Similarly, after controlling for other firm-level characteristics advertisement intensity has no statistically significant effect on Tobin's Q. Column 2 reports the results of the test of parallel trend before FY 2015. We use data for the time period FY 2006-2010 considering hypothetically (placebo) FY 2008 as the year of CSR law enactment. We see that the coefficient of the treatment dummy defined based on FY 2008 as the cut-off year is positive but statistically insignificant. This result indicates that treatment and control firms' Tobin's Q are indeed on similar time trend before FY 2015 and hence our DiD estimation results are valid. The coefficient of firm size measured by total assets in log terms is negative and statistically significant at the 1 percent level. This is justified on the grounds that larger firms tend to have lesser Tobin's Q as compared to smaller firms since the former is more likely to be older and have lesser investment opportunities than the latter (Servaes and Tamayo (2013); Flammer (2015)) [49] . The other coefficients have the desired sign and statistical significance.

6.4 *Robustness tests' results*

Column 3 of Table 7 reports the results of DiD with PSM after inclusion of some additional covariates: selling intensity, efficiency, and capital spending. [50] The coefficient of the *treatment dummy* remains positive (0.110) and statistically significant. Out of these three additional controls, only capital spending is positively related with Tobin's Q and it is also

[48] We also estimate Eqn 1 with balanced panel data for FY 2006-2016 and find qualitatively similar results. Use of bootstrap standard errors also produces similar results (these results are available upon request).

[49] Manchiraju and Rajgopal (2015) also find a similar result in their study. However, the authors measure firm size by employing market capitalization.

[50] We also add a dummy for firms above the stipulated thresholds of CSR Act 2013 (Affected Dummy) as an additional control in the original DiD regression specification and obtain similar results.

Table 7: Impact estimates of mandatory CSR spending on firm-value

	log(Tobin's Q)				ROA
	(1)	(2)	(3)	(4)	(5)
treatment dummy (Dit)	0.106***	0.021	0.110***	0.123***	0.012**
	(0.036)	(0.028)	(0.036)	(0.029)	(0.006)
log(total assets)	-0.056	-0.176***	-0.028	-0.081***	-0.020***
	(0.029)	(0.038)	(0.036)	(0.029)	(0.005)
advertisement intensity	-0.115	-0.832**	0.955	0.452	-0.064
	(0.566)	(0.378)	(0.615)	(0.406)	(0.075)
cash ratio	0.854***	0.567***	0.835***	0.923***	0.156***
	(0.150)	(0.154)	(0.173)	(0.119)	(0.029)
leverage	-0.322***	-0.233**	-0.351***	-0.154**	-0.138***
	(0.093)	(0.105)	(0.111)	(0.074)	(0.015)
Other covariates					
selling intensity			-0.302		
			(0.189)		
efficiency			-0.006		
			(0.006)		
capital spending			0.045**		
			(0.022)		
year fixed effects	Yes	Yes	Yes	Yes	Yes
firm fixed effects	Yes	Yes	Yes	Yes	Yes
constant	0.923***	1.692***	0.524**	0.946***	0.286***
	(0.174)	(0.237)	(0.248)	(0.169)	(0.038)
R^2	0.283	0.495	0.248	0.254	0.188
Adjusted R^2	0.281	0.493	0.246	0.253	0.186
Observations	6191	2554	5463	8875	6917

Note: Column 1 presents DiD estimates combined with PSM using NN=5 algorithm. Column 2 presents DiD estimation results for matched firms performed using data for FY 2006-2010 with 2008 as the hypothetical cut-off year (placebo experiment). Column 3 presents DiD combined with PSM (NN=5) estimation results with other covariates. Column 4 presents DiD estimates without matching. Column 5 shows DiD combined with PSM estimation results for ROA. Heteroscedasticity robust standard errors clustered at the firm-level are reported in parentheses. We winsorise ROA at 1% for both upper and lower tails. Following Hirano et al. (2003), in all DiD combined with PSM estimations we use propensity scores as weights. ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

statistically significant suggesting firms with higher future cash flows tend to have higher firm value. Column 4 of Table 7 reports the results of simple DiD estimation results. We find that the coefficient of the *treatment dummy* is positive and statistically significant at the 1 percent level. We consider ROA as an alternative short run proxy for firm value and use it as the dependent variable in Eqn 1. The estimation results so obtained are presented in column 5. We find that the coefficient of *treatment dummy* is positive and statistically significant at the 1 percent level suggesting that treatment firms have 1.2 percent higher ROA compared to control firms. Thus, even in the short run we do find that mandatory spending on CSR impacts firm's profitability positively. Other remaining variables except log of total assets have similar signs and statistical significance as our baseline regression (column 1).

We turn next to endogenous switching regression results presented in Table 8. Looking at column 1 we can see that the coefficient of CSR dummy (0.778) is positive and statistically significant at the 1 percent level. The result suggests spending on CSR enhances firm value. We also find that the coefficient of the interaction between CSR dummy and dummy for firms affected by CSR law of 2013 is also positive and statistically implying that affected firms who comply immediately derive benefit in terms of higher firm value. Further, we add an interaction between advertisement intensity and dummy for CSR (see column 2). The coefficient of this interaction variable turns out to be positive and statistically significant. This result suggests that firms spending on both CSR and advertisement tend to have even higher firm value. Firms spending on advertisement can generate higher customer awareness about the firms and their CSR activities and therefore, their CSR expenditures contribute positively to firm value. This result is in line with the results obtained in Servaes and Tamayo (2013). The coefficients of all other covariates except leverage (firm size, advertisement intensity, cash ratio, and leverage) have desired sign and significance.Finally, we find that the estimated ρ is negative and statistically significant at the 5% level suggesting that the unobserved factors that affect decision to spend on CSR are negatively correlated with

the unobserved factors that govern firm value. Hence, endogenous switching regression estimation results are valid.

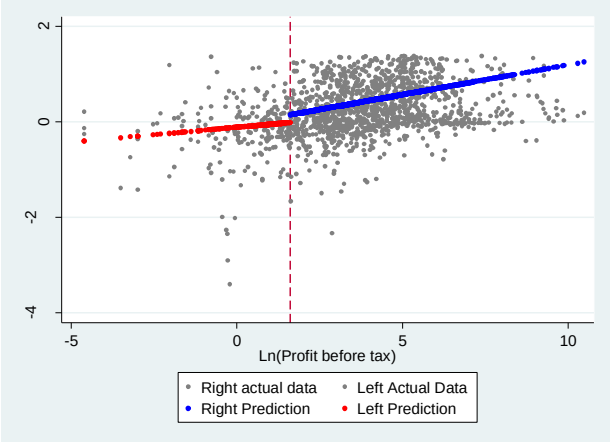
Table 8: Endogenous switching regression results

	(1) log(Tobin's Q)	(2) log(Tobin's Q)
treatment_dummy	0.778***	0.768***
	(0.136)	(0.138)
affected_dummy	0.209***	0.215***
	(0.065)	(0.065)
treatment_dummy×affected_dummy	0.186**	0.171**
	(0.083)	(0.082)
log(total assets)	-0.065***	-0.071***
	(0.023)	(0.024)
advertisement intensity	1.445**	-0.522
	(0.655)	(0.997)
cash ratio	0.644	0.708**
	(0.340)	(0.347)
leverage	-0.161	-0.174
	(0.137)	(0.138)
advertisement intensity×treatment_dummy		3.360**
		(1.381)
year dummies	Yes	Yes
constant	0.020	0.066
	(0.110)	(0.115)
Ln(pseudolikelihood)	-2750.535	-2742.622
λ	-0.450**	-0.458**
ρ	-0.635**	-0.646**
Observations	1789	1789

Note: Column 1 shows endogenous switching regression estimation results using data for FY 2015 and 2016. *treatment dummy =1* for firms who spent on CSR for the first time on CSR in FY 2015 or later and *treatment dummy=0* otherwise. Column 2 presents endogenous switching regression estimation results with *advertisement intensity* interacted with *treatment dummy*. Robust standard errors clustered at the firm-level are in parentheses. ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

We discuss next the randomization inference test results reported in panel B of Table 6. The lower and upper limits of randomization inference test are -0.028 and 0.028 respectively. Our DiD combined with PSM impact estimate obtained from regression Eqn 1 clearly lies outside the computed interval and hence we reject the null of no treatment effect . We conclude that mandatory CSR spending does impact firm value positively. This robustness check result lend further credence to our original DiD impact estimate.

Figure 2: Regression discontinuity design at PBT threshold (INR 5 crore)



Note: Sample data for FY 2015 and 2016 are used.

In Figure 2 we examine RDD graphically by plotting log of Tobin's Q against log of PBT. According to Companies Act 2013, the threshold in terms of PBT is stipulated at INR 5 crores. We use this threshold (shown as dotted line) in Figure 2 and find a distinct jump or discontinuity at the said threshold. Thus, firms just above the stipulated PBT threshold who are required to spend on CSR have higher Tobin's Q on an average compared to firms who are just below the PBT threshold. We further test statistical significance of this finding using a regression equation. The estimation results of Eqn 3 are presented in Table 9. The coefficient of the *treatment dummy* is positive and statistically significant, lending further support to our graphical observation.

7 Conclusions

The Ministry of Corporate Affairs, Government of India made it mandatory for all firms above certain threshold to spend at least 2% of their average net profit over the last three years on CSR from FY 2015. Like any other expenditure, spending on CSR should also be justified from shareholders' perspective even if it is mandatory and makes some positive social impact. Hence, firms required to spend on CSR can spend on CSR in such a way that it enhances firm value. The act came into effect from FY 2015 and therefore it offers a

Table 9: Estimation results of regression discontinuity design (RDD)

	log(Tobin's Q)
treatment_dummy	0.160**
	(0.079)
deviation_threshold	0.063
	(0.037)
treatment_dummy×deviation_threshold	0.062
	(0.040)
year dummies	Yes
constant	-0.024
	(0.070)
R^2	0.15
adjusted R^2	0.148
observations	1647

Note: The discontinuity is at the threshold (INR 5 crore) defined in terms of PBT as per Section 135 of Companies Act 2013. Sample data for FY 2015 and 2016 is used; *treatment dummy*=1 for firms with PBT exceeding the stipulated threshold and *treatment dummy*= 0 otherwise; *deviation_threshold* is the difference between PBT of the firm in question and the stipulated threshold; heteroscedasticity robust standard errors clustered at the firm-level are reported in parentheses ***, **, * indicate statistical significance at 1%, 5% and 10% respectively.

unique setting to test whether mandatory spending on CSR can be value enhancing. Using firm-level panel data from FY 2006 to FY 2016 this study examines the same empirically. However, the Companies Act 2013 in its current form provides flexibility in terms of CSR spending by making it "comply-or-explain" for Indian firms who are affected by the CSR law in initial years. This is because many firms having no prior experience of investing in CSR might find it difficult to comply immediately. In other words, a firm above the stipulated threshold can comply by spending on CSR immediately from FY 2015 or can decide to spend later. Thus, even after passage of the Companies Act 2013, decision to spend on CSR in initial years remains largely discretionary. We address this issue of endogeneity while drawing causal inference about the impact of mandatory CSR spending on firm value by employing difference-in-differences combined with PSM. Our results show that after controlling for several firm-level characteristics compulsory spending on CSR has positive and statistically significant impact on firm value. This result is also robust to several other econometric issues and consistent with the results of other studies in the existing literature (Gillan et al.

(2010);Servaes and Tamayo (2013)). This study has a few limitations. First, the Companies Act 2013 specifies certain expenditures which qualify as CSR spending by Indian firms. The list of permissible CSR expenses includes spending on health, education, environment, etc. One limitation of this study is that we cannot comment on the type of CSR spending that matters for enhancing firm value. Second, we have used data for FY 2015 and 2016 post enactment of CSR law. Therefore, we still do not know much about the long term impact of mandatory CSR spending on firm value. One of the directions for future studies on CSR in Indian context could be this.

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References

Abadie, A. and G. Imbens (2011). Bias-corrected matching estimators for average treatment effects. *Journal of Business and Economic Statistics*, *29*(1), pp.1–11.

Albinger, H. and S. Freeman (2000). Corporate social performance and attractiveness as an employer to different job seeking populations. *Journal of Business Ethics*, *28*(3), pp.243–253.

Albuquerque, R., Y. Koskinen, and C. Zhang (2017). Corporate social responsibility and firm risk: Theory and empirical evidence. *European Corporate Governance Institute Working Paper* (359/2013).

Bansal, S. and S. Rai (2014). An analysis of corporate social responsibility expenditure in india. *Economic and Political Weekly*, *49*(50).

Barnea, A. and A. Rubin (2010). Corporate social responsibility as a conflict between shareholders. *Journal of Business Ethics*, *97*(1), pp.71–86.

Baron, D. (2008). Managerial contracting and corporate social responsibility. *Journal of Public Economics*, *92*(1), pp.268–288.

Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust difference-in-differences? *Quarterly Journal of Economics*, *119*(1), pp.249–275.

Black, B. and W. Kim (2012). The effect of board structure on firm value: A multiple identification strategies approach using korean data. *Journal of Financial Economics*, *104*(1), pp.203–226.

Cerulli, G. (2015). *Econometric Evaluation of Socio-Economic Programs: Theory and Applications*. Springer.

Cheng, I., H. Hong, and K. Shue (2016). Do managers do good with other people's money? *Working Paper*.

Cheng, B. Ioannou, I. and G. Serafeim (2014). Corporate social responsibility and access to finance. *Strategic Management Journal*, *35*(1), pp.1–23.

Cheung, A. (2016). Corporate social responsibility and corporate cash holdings. *Journal of Corporate Finance*, *37*, pp. 412–430.

Clelland, I.J. Dean, T. and T. Douglas (2000). Stepping towards sustainable business: An evaluation of waste minimization practices in us manufacturing. *Interfaces*, *30*(3), pp.107–124.

Dharmapala, D. and V. Khanna (2016). The impact of mandated corporate social responsibility: Evidence from india's companies act of 2013. *Coase-Sandor Working Paper Series in Law and Economics*.

Efron, B. and R. J. Tibshirani (1993). *An Introduction to the Bootstrap*. Chapman & Hall.

El Ghoul, S., O. Guedhami, and Y. Kim (2017). Country-level institutions, firm value, and the role of corporate social responsibility initiatives. *Journal of International Business Studies*, *48*(3), pp.360–385.

El Ghoul, S., O. Guedhami, C. C. Kwok, and D. Mishra (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking and Finance*, *35*(9), 2388–2406.

Fama, E. and K. French (1995). Size and book-to-market factors in earnings and returns. *The Journal of Finance*, *50*(1), pp.131–155.

Fama, E. and K. French (1996). Multifactor explanations of asset pricing anomalies. *The Journal of Finance*, *51*(1), pp.55–84.

Flammer, C. (2014). Does product market competition foster corporate social responsibility? evidence from trade liberalization. *Strategic Management*, *36*(10), pp. 1469–1485.

Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? a regression discontinuity approach. *Management Science*, *61*(11), pp.2549–2568.

Freeman, R. (1984). *Strategic Management: A Stakeholder Approach*. Pitman Boston.

Friedman, M. (1970). The social responsibility of business is to increase its profits.

Galema, R., A. Plantinga, and B. Scholtens (2008). The stocks at stake: Return and risk in socially responsible investment. *Journal of Banking & Finance*, *32*(12), 2646–2654.

Gillan, S. L., J. C. Hartzell, A. Koch, and L. Starks (2010). Firm's environmental, social and governance (esg) choices, performance and managerial motivation. *Working paper*.

Goss, A. (2009). Corporate social responsibility and financial distress.

Grant, A., J. Buttle, S. McKenzie, and G. Veale (2002). Corporate Social Responsibility: A Survey of Global Companies.

Guenster, N., J. Bauer, R. Derwall, and K. Doedijk (2011). The economic value of corporate eco-efficiency. *European Financial Management*, *17*(4), pp.679–704.

Hirano, K., G. W. Imbens, and G. Ridder (2003). *Econometrica*, *71*(4), pp.1161–1189.

Jensen, M. and W. Meckling (1976). Theory of the firm: Managerial behavior, agency costs, and capital structure. *Journal of Financial Economics*, *3*(4), pp.305–360.

Jones, T. M. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *The Academy of Management Review*, *20*(2), pp.404–437.

Khandker, S. R., G. B. Koolwal, and H. A. Samad (2010). *Handbook on Impact Evaluation, Quantitative Methods and Practices*. The World Bank.

Khanna, T. and K. Palepu (2000). Is group affiliation profitable in emerging markets? an analysis of diversified indian business groups. *The Journal of Finance*, *55*(2), 867–891.

Lys, T., J. Naughton, and C. Wang (2015). Signaling through corporate accounting reporting. *Journal of Accounting and Economics*, *60*(1), pp.56–72.

Maddala, G. (1983). *Limited-dependent and Qualitative Variables in Econometrics*. Cambridge University Press.

Manchiraju, H. and S. Rajgopal (2015). Does corporate social responsibility (csr) create shareholder value? exogenous shock-based evidence from the Indian companies act 2013,. *Working paper*.

Margolis, J., H. Elfenbein, and J. P. Walsh (2007). Does it pay to be good? a meta-analysis and redirection of research on the relationship between corporate social and financial performance. *Working Paper, Harvard Business School*.

Masulis, R. and S. Reza (2015). Agency problems of corporate philanthropy. *The Review of Financial Studies*, *28*(2), pp.592–636.

McWilliams, A. and D. Siegel (2001). Corporate social responsibility: A theory of the firm perspective. *The Academy of Management Review*, *26*(1), pp.117–127.

Mukherjee, A. and R. Bird (2016). Analysis of mandatory csr expenditure in india: A survey. *International Journal of Corporate Governance*, *7*(1), pp.32–59.

Peterson, D. (2004). The relationship between perceptions of corporate citizenship and organizational commitment. *Business Society*, *43*(3), pp. 296–319.

Reinhardt, F. (1998). Environmental product differentiation: Implications for corporate strategy. *California Management Review*, *40*(4), pp.43–73.

Reinhardt, F., R. Stavins, and R. Vietor (2008). Corporate social responsibility through an economic lens. *Harvard Kenndy School Working Paper RWP08-023*.

Rosenbaum, P. R. (2010). *Design of Observational Studies*. Springer-Verlag.

Russo, M. and P. Fouts (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, *40*(3), pp.534–559.

Russo, M. and N. Harrison (2005). Organizational design and environmental performance: Clues from the electronics industry. *Academy of Management Journal*, *48*(4), pp.582–593.

Sarkar, J. and S. Sarkar (2015). Corporate social responsibility in india - an effort to bridge the welfare gap. *IGIDR Working Paper (WP-2015- 023)*.

Servaes, H. and A. Tamayo (2013). The impact of corporate social responsibility on firm value: The role of customer awareness. *Management Science*, *59*(5), pp.1045–1061.

UN Global Compact-Accenture (2010). A new era of sustainability.