

Should Firms Always Invest in Corporate Social Responsibility? Whether, When, and How?

Abstract

Firms in various markets such as health care, financial services, software, consumer goods etc. spend significant amount of money on corporate social responsibility (CSR) activities. The literature suggests that consumers take into consideration firms' CSR activities when making purchase decisions and this leads to either an increase in willingness to pay or an increase in purchase intention. Unfortunately, notwithstanding its strategic benefits, the empirical findings regarding the impact of CSR on firms' financials are mixed. In this paper we explore when and why investing in CSR can have positive or negative impact on firm's profitability. In doing so we model two types of CSR (i.e., company ability relevant CSR (CSR-CA) and company ability irrelevant CSR (CSR-NCA)) and allow firms to choose which one to pursue if they decide to invest in CSR, and incorporate the indirect effect of CSR through contrast effect (that can be positive or negative) on consumers' utility, which has been ignored by the extant literature. Our analysis reveals the conditions under which it is optimal to invest in CSR and of what type. Then, we extend our analysis by investigating whether being the first mover in investing in CSR increases the profitability and whether competitively advantaged (disadvantaged) firm benefits more from CSR.

(Corporate Social Responsibility; Competition; Contrast Effect)

1 Introduction

Firms in various markets such as health care, financial services, software, consumer goods etc. spend significant amount of money on corporate social responsibility (CSR) activities. Recently Financial Times has reported that the fortune 500 companies have spent more than \$15 billion on CSR, this spending has come in various forms such as donating free drugs (Johnson & Johnson), giving free software (Oracle), investing in educational programs in developing countries (Prudential) or creating a more productive work environment for various minority groups (Chicago Fed). We have also seen that large business corporations like Microsoft in recent years have spent more than 900 million US dollars on CSR related activities. The '*2014 CSR reputation study*' observes that globally increasing number of companies are investing in CSR as consumers prefer companies with good CSR reputations. The study suggests that eighty nine percent of consumers are willing to recommend companies with excellent CSR reputation as opposed to only six percent who are willing to recommend companies with average CSR reputation.

The literature suggests that consumers take into consideration firms' CSR activities when making purchase decisions and this leads to either an increase in willingness to pay or an increase in purchase intention (Bhattacharya and Sen, 2004; Creyer and Ross, 1997; Pen Schoen Berland, 2010). In a recent global survey conducted by Nielsen, fifty percent of 29,000 respondents across 58 countries were found to be willing to pay more for the products and services developed by companies that invest in CSR. More importantly, 43 percent of these consumers actually paid substantially higher prices for products and services developed by the companies which have implemented some sort of CSR agenda.

CSR programs can be costly and also compete for firms' limited financial resources for other marketing activities such as new product development and advertising. Naturally, firms are concerned about the financial impact of CSR. Unfortunately, notwithstanding its strategic benefits, the empirical findings regarding the impact of CSR on firms' financials are mixed (Margolis et al., 2009; Margolis and Walsh, 2003). Several reasons have been suggested for this outcome. Different studies have used different measures for firms' financial performance and for firms' CSR performance or focused on different dimensions of CSR. Some researchers claim that many of the studies investigating the financial impact of CSR ignore the indirect link between CSR and firms' financials that is through the effect of CSR on consumers' attitudes and behavior towards

firms' products or omitting important control variables such as R&D that may in fact mediate the relationship between CSR and firm financials. Another possible factor which prevents CSR from increasing profit is misalignment of interests of different stakeholder groups. If firms choose CSR activities that consumers do not appreciate but consider it as an opportunity cost then CSR would not have the intended impact on the financials of the firms. Trudel and Cotte (2009) however show that this would rarely be the case as consumers by and large are willing to pay substantially higher prices for CSR products. Therefore, this explanation is at best weak.

In this paper, we propose a much more nuanced explanation for when and why investing in CSR can have positive or negative impact on firm's profitability, which also provides a roadmap to the managers to invest efficiently in CSR. First, there are mainly two types of CSR: company ability relevant CSR (CSR-CA) and company ability irrelevant CSR (CSR-NCA). An example of CSR-CA would be investing in wellness training for employees or on an on-site daycare which would enhance the efficiency of the employees. Investing in building homes for the underprivileged in Haiti would be an example of CSR-NCA. There are many examples to both types of CSR. Ben and Jerry's for example has implemented fair trade norms in their production and created a dairy farm sustainability program which would eventually enhance company's performance and perhaps bring in better quality product. On the other hand, we have companies like Tom's shoes which donate a pair of shoes to a child every time a customer purchases its product – clearly this is a CSR strategy which would not improve company ability per se.¹ Consumers' willingness to pay for a firm's products increases when they observe the firm invest in CSR, of either type. But, when a firm invests in CSR-CA, it helps to improve the firm's R&D and manufacturing capabilities, which in turn increases the firm's success probability in new product development (Sen and Bhattacharya, 2001). On the other hand, CSR-NCA does not influence corporate ability. A recent article by Rangan et al. (2015) discusses how firms' activities are divided among different 'theatres of practice' - while some firms use the CSR activities to focus on philanthropy, others utilize the CSR opportunity to improve their operational effectiveness. When a firm invests in CSR-CA, the efficiency and effectiveness of its employees increases which in turn increases the R&D and/or manufacturing capability. As a consequence, consumers now expect the firm's new product to be of higher quality. Due to this increased quality expectation the consumers now derive less utility from the firm's new product. This effect of consumers'

¹Please see <http://www.businessnewsdaily.com/4679-corporate-social-responsibility.html>.

perception of the corporate ability on the product evaluation is known as the ‘contrast effect’ in the behavioral literature. Therefore, unlike CSR-NCA, CSR-CA has two conflicting effects on consumer utility. While the direct effect (i.e., willing to pay extra for the product which is produced by a firm that invests in CSR) is positive, the indirect effect (i.e., the contrast effect) is negative. When a firm is deciding whether to invest in CSR, it should also consider what kind of CSR to pursue and how its decision will affect its R&D and manufacturing capabilities and as a result consumers’ willingness to pay for its new product. This implies that if a firm ignores the indirect effect of CSR it may make an inefficient CSR decision, which can lead to reduced profits.

In this research, we specifically address the following questions: 1. Under what conditions is it optimal to invest in CSR and of what type?, 2. Does being the first mover in investing in CSR increase the profitability?, and 3. Which firm benefits more from CSR, the competitively advantaged or the competitively disadvantaged one? For this, we construct an analytical model in which there are two firms, with asymmetric R&D capabilities, working on developing a new product. Each firm has a fixed budget to spend either on pure R&D or on a CSR activity. If a firm chooses to invest in CSR then it also has to choose whether to pursue CSR-CA or CSR-NCA. First, the focal firm chooses its CSR strategy followed by the rival’s choice of its CSR strategy. Firms then simultaneously set prices of their new products. If a firm chooses to invest in CSR, consumers’ willingness to pay for the firm’s new product increases. Furthermore, if a firm chooses to invest in either CSR-CA or in pure R&D (NCSR) then its R&D capability improves and, given the uncertain nature of R&D, the probability of the firm developing the new product increases. The investment in pure R&D (NCSR) is not observable to the consumers but, the investment in CSR-CA by the firm is visible to consumers. Hence, consumers become aware of this improvement in the firm’s R&D capability.

If there is no contrast effect then CSR-CA is the dominant strategy for the focal firm. However, with the contrast effect present, we find that depending on whether the rival is able to invest in CSR, the focal firm’s R&D capability relative to the rival’s, the size of the ratio of the relative gain from CSR to the relative gain from the contrast effect, and the level of consumers’ sensitivity to contrast effect, CSR-NCA or NCSR can also be the optimal strategy for the focal firm. Interestingly, we observe that when the focal firm is less capable in R&D than the rival, under certain conditions it prefers to spend its resources not to improve its R&D capabilities and

increase its chance to successfully develop the new product, but to invest in CSR-NCA while the rival invests in CSR-CA or NCSR. Our results reveal that the firm can strategically use CSR to alter both the consumers' and its rival's behavior (i.e., the decision of whether to invest in CSR and if so, in which type of CSR). Furthermore, by conducting a behavioral experiment we provide support to the existence of contrast effect in the CSR context and show that consumers' new product evaluations are lower when a company engages in company ability related CSR than when a company engages in company ability irrelevant CSR.

Finally, we investigate whether being the first mover in investing in CSR increases the profitability and whether the competitively advantaged or the competitively disadvantaged firm benefits more from CSR. We find that being the first mover in investing in CSR increases the profitability only if the optimal strategy is to pursue CSR-CA (i.e., being first mover in CSR investment is not always more profitable). When being first mover in investing in CSR-CA is more profitable, the first mover can earn higher profits than its rival even if it has a lower R&D capability than the rival. Therefore, by being the first mover in investing in CSR-CA, a firm can overcome its competitive disadvantage. We also find that the competitively disadvantaged firm (i.e., the firm which is less capable in R&D than its rival) benefits from CSR more than the competitively advantaged firm.

The remainder of the paper is organized as follows. In the next section we discuss how our work is related to the extant literature. We lay out the model setup in Section 3 and examine in Section 4 the benchmark case in which the rival cannot invest in CSR. In Section 5 we solve for the case in which both firms can invest in CSR. In Section 6 we explain our behavioral experiment and discuss its results. Finally, Section 7 summarizes the results and concludes the paper with discussion of future research directions.

2 Literature Review

In recent years a number of papers have shown that CSR may lead to many commercial benefits for the business organizations as well. For example, CSR activities would have positive influence on brand/company evaluations, brand choice, brand recommendations, customer satisfaction and loyalty, customer-firm identification, and consumers' attributions in a product-harm crises situation (Brown and Dacin, 1997; Sen and Bhattacharya, 2001; Luo and Bhattacharya, 2006;



Berens et al., 2005; Klein and Dawar, 2004). CSR may directly influence consumers' purchase intention, in fact according to Mohr and Webb (2005) CSR activity would have a stronger effect than price on consumers' purchase intentions.

However, the empirical findings regarding relationship between CSR and financial performance are mixed. Some find positive relationship between CSR and firm financials (Orlitzky et al., 2003; Beurden and Gossling, 2008; Wu, 2006; Maron, 2006; de Velde et al., 2005; Gregory et al., 2014), some find negative relationship (Wright and Ferris, 1997; Griffin and Mahon, 1997; Brammer et al., 2006), and some find no significant relationship (McWilliams and Siegel, 2000; Seifert et al., 2003, 2004; Moore, 2001; Soana, 2011). There are also studies that identify mixed relationship between CSR and firm financials. Specifically, Inoue and Lee (2011) confirm that various CSR dimensions like attention to community or attention to environment and diversity either negatively affect airline firms' financial performance or do not have any positive effect. More importantly, this paper shows that the effect of CSR may vary across different CSR dimensions – the same airline firms may see positive effect of CSR on their financial performance as long as we measure CSR on product dimension. The research insight from this paper suggests that aggregation methodology (i.e. how we develop a composite measurement of CSR based on multiple dimensions) would have a critical role to play in this context. Moreover, there exist a substantial number of papers which differentiate between company ability relevant CSR and company ability irrelevant CSR. Bauman and Skitka (2012) suggest that some form of CSR can provide employees with sense of security, feelings of belongingness, self-esteem and a deeper sense of purpose at work, all of which would eventually make them more productive. Bhattacharya et al. (2008) further argue that companies often use CSR as internal marketing lever which in turn help the managers to understand and fulfill employee needs - this kind of CSR is certainly related to overall company ability. Some concrete examples in this regard have been provided by Mirvis (2012) - supply chain practices that respect the workers who actually make the products or HIV/AIDS initiatives that protects employees or creating a 'results only work environment' (ROWE) which gives employee flexibility in managing work and personal time are all examples of company ability relevant CSR. Bhattacharya et al. (2014) explain that CSR is one of the most innovative ways to motivate frontline employees (i.e. customer service representatives) in delivering superior client services. The authors for example believe that when companies invest in offering ethically made products, it not only enhances the brand image of the company itself

but also helps the frontline employees to disseminate product related information to customers in a more effective fashion. Many companies purposefully bring in skill-enhancing CSR elements, as per Shen and Benson (2014) when companies take account of employee's social contribution in promotion, performance appraisal and remuneration they basically invest in CSR-CA. This practice obviously enhances employee performance but also helps the employees to build a distinct organizational identity. Given the importance of CSR dimensions, these papers clearly justify further categorization of CSR activities (i.e. CSR-NCA vs. CSR-CA).

As summarized in the review paper Margolis et al. (2009), across a total of 251 papers there is a mildly positive relationship such that the median and weighted average effect size of CSR on firm financials is lower than the mean effect size. Thus, the mean is inflated by large effect sizes of a small number of studies that used relatively small sample of companies. It has been suggested that this conflicting outcome in the literature may be caused by focusing on different dimensions of CSR and omitting important control variables. For example, McWilliams and Siegel (2000) and Surroca et al. (2010) show that when one includes firms' R&D capabilities into the analysis the relationship between CSR and firm financials becomes insignificant. Given this confusion in the empirical findings, Margolis et al. (2009) suggest that future research needs to establish the causal mechanism between CSR and firm's financial, and characterize the conditions under which firms should engage in CSR and how to do it effectively. There is recent empirical work that embarks on explaining the mixed results in the literature by suggesting a mediation mechanism between CSR and firm's financials. Surroca et al. (2010) empirically show that there is no direct effect of CSR on a firm's financials. Firms' intangible assets such as R&D, human resources, and brand value mediate the relationship between CSR and the firm's financials. Specifically, when a firm invests in CSR this may either improve (sometimes even destroy) its R&D capability, human resources, and brand value, which in turn affects positively (or negatively) its financials. Luo and Bhattacharya (2006) show that customer satisfaction mediates the effect of CSR on the market value and this effect can be positive or negative depending on the firm's corporate capability (i.e., innovation capability).

While there are various empirical papers that investigate whether CSR has positive or negative impact on financial performance, there are fewer analytical papers that study when and why investing in CSR is profitable. Becchetti et al. (2014) suggests that when consumers' social responsibility does not grow as per firm's ethical capital, the optimal strategy for the firms would

be to compete on price and not on CSR investment. Baron (2001) finds that when competition is high (i.e., product differentiation is low) few firms would invest in CSR at the equilibrium. In this case, as product differentiation decreases, so does the disutility of not investing in CSR. Similarly, Bagnoli and Watts (2003) find that when the degree of price competition is quite high, CSR would invariably reduce the profitability of the firms. In more recent studies, Baron (2009) argues that even when consumers are willing to reward all firms for their socially responsible performance, different firms may realize different magnitudes of CSP (Corporate Social Performance) related social pressure and Garcia-Gallego and Georgantzis (2009) find that mostly when consumers' own social consciousness increases, the profit of a socially responsible firm goes up. Krishna and Rajan (2009) first experimentally show that consumers obtain both a direct utility from purchasing a product linked to a cause and also obtain a spillover utility from purchasing other non-cause-marketed products in the firm's portfolio. Then, by building a duopoly model in which each firm has two products, the authors show that without spillover effect firms will have both products on cause marketing unless the cost of cause marketing is too high. However, with spillover effect firms will have only one of their product on cause marketing and hence, avoid head-to-head competition in cause marketing. This way firms increase their profits from cause marketing. Finally, very recently Iyer and Soberman (2015) investigate the relationship between consumers' social comparison benefits/costs and firms' incentive to invest in R&D which makes their product more socially responsible. A consumer derives a social comparison benefit when he interacts with another consumer who consumes less socially responsible product and incurs a social comparison cost when he  **interact** with someone who  **consumes** more socially responsible product. Authors show that when economic value of the product is low (high), incentive to innovate in order to make the product more socially responsible decreases (increases) as social comparison effects increase.

In this paper, different from the extant analytical work, we develop an analytical model which incorporates the two types of CSR activities (company ability relevant CSR and company ability irrelevant CSR), the indirect effect of CSR on consumers' utility (i.e., the contrast effect), and the link between CSR and the firm's R&D capability (i.e., the mediating role of R&D between CSR and profitability) as suggested by the recent empirical work. In fact, the way we model the firm's R&D capability can also capture the positive effect of CSR on human resources. As suggested by the literature (see Surroca et al. (2010)) when a firm engages in a CSR activity that improves

the working conditions, it in turn improves the employees' productivity and hence the firm's product/process innovation capabilities as well. We believe that our model, by incorporating the recent findings of the empirical literature on CSR, enables us to perform a more comprehensive analysis of when firms should invest in CSR and if so then which type of CSR they should pursue.

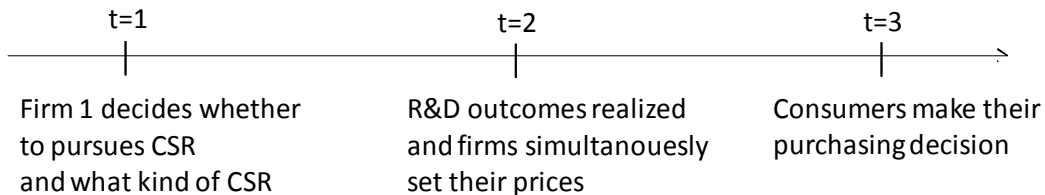
3 Model Setup

There are two firms (Firm 1 and Firm 2) producing identical products from which consumers derive utility v . Both firms are working on developing a new product with an extra quality θ . With probability x (y) Firm 1 (Firm 2) will be successful in its R&D efforts and develop the new product. Consumers currently have a working-condition old product manufactured by one of the firms and their willingness to pay for extra quality is equal to one.

Each firm receives a fixed R&D endowment, which they can spend to increase their new product development success probability. However, Firm 1 is allowed to spend its R&D budget to do CSR as well. If it prefers to do so it can choose between two types of CSR; company ability relevant CSR (CSR-CA) or company ability irrelevant CSR (CSR-NCA). If Firm 1 pursues CSR-CA then it improves its R&D capability as well and as a result its new product development success probability increases to one. If Firm 1 pursues CSR-NCA strategy then its R&D capability does not change. If Firm 1 prefers not to do CSR, but spends the money for pure R&D (we call this strategy NCSR) then the company's R&D capability increases to one.

The game proceeds as follows. At $t=1$ Firm 1 decides whether to do CSR and if so what kind of CSR. At $t=2$ firms' R&D outcomes are realized and they simultaneously set their prices. Finally, at $t=3$ consumers make their purchasing decision and the game ends. We assume that manufacturing cost for both the old products and the new products is equal to zero. Figure 1 depicts the timeline.

Figure 1: Timeline of The Game



Next, we explain how we model consumers' utility functions under each strategy (i.e., CSR-CA, CSR-NCA, and NCSR). We build our utility function based on the findings of the experimental work in the consumer behavior literature and CSR literature. There are both direct and indirect effect of CSR on consumers' evaluation of a product. The direct effect is positive, i.e., consumers' willingness to pay for the product increases due to CSR activity being performed by the firm. On the other hand, CSR can also have a negative indirect effect on consumers' product evaluation via 'contrast effect'. According to consumer behavior literature, as consumers' judgment standard (attitude) in price and quality changes their product evaluation would also change as a result of contrast effect. Specifically, as the discrepancy between the judgment standard and the product performance in quality and price increases the evaluation of the product becomes more favorable (less favorable) if the discrepancy is positive (negative) (see Lynch et al. (1991)). As the magnitude of discrepancy increases so does the distortion in the product evaluation. In his work on product line extensions, Kim (2006) shows that due to the contrast effect a moderately typical product extension (such as mediocre quality and medium price) from a favorable manufacturer (such as a high quality and high price) often receives lower evaluations than the same product from an unfavorable manufacturer. The author argues that this happens because consumers use the products that are typically produced by the manufacturers as a standard comparison. In their work on the effect of CSR on company and product evaluation, Brown and Dacin (1997) demonstrate that due to the contrast effect when consumers evaluate a product in the context of low perceived company ability, the product evaluation tends to be high compared to a situation when the company is perceived to have high ability. However, if a company pursues product irrelevant-CSR activities then these activities would not affect consumers' perception of corporate ability of developing new product and hence, only induce positive direct effect on the product evaluations (i.e., this type of CSR activities will not induce contrast effects in consumers' product evaluations). In a similar spirit, Biehal and Sheinin (2007) show that corporate ability related messages are more diagnostic for forming product beliefs than non-corporate ability related CSR messages. Sen and Bhattacharya (2001) claim that as the company's CSR performance increases so does the evaluation of the company among the consumers who highly support the CSR domain and think that the firm's CSR activities are highly relevant to the product evaluations. The authors experimentally show that as the evaluation of the company becomes more favorable, as a result of its CSR activities, the presence of contrast effect distorts the purchase intentions

of these consumers for even a high quality new product. Moreover, all the consumers, regardless of their expertise, are susceptible to contrast effect. In the light of these experimental works we model consumers' utility function such that it has two components. First component is the absolute utility consumers derive from the product. This is equal to $v + \theta + \gamma - p$, where p is price and γ is the increase in consumers' willingness to pay due to CSR activity being performed by a firm, if a firm invests in CSR and to $v + \theta - p$ if a firm does not invest in CSR. The second component is the relative utility with respect to consumers' judgment of the firm's ability to develop the new product with an extra quality θ (i.e., the firm's expected R&D capability). This is equal to $\lambda\theta(1 - \text{expected R\&D capability})$, where λ is the sensitivity of product evaluation to the evaluative context (i.e., consumers' judgment of the firm's R&D capability). Note that as the firm's expected R&D capability decreases consumers evaluate the new product more favorably. In other words, when consumers evaluate the new product in the context of unfavorable corporate judgment (i.e., low expected R&D capability case), their evaluations are contrasted away from the context and as a result higher than their evaluations of the same product in the context of favorable corporate judgment (i.e., high expected R&D capability case). Therefore, in our model $\lambda\theta(1 - \text{expected R\&D capability})$ represents the contrast effect.² We would like to note that in order to provide much solid support to the existence of contrast effect in the context of CSR we conducted a behavioral experiment and showed that consumers' new product evaluations are lower when a company engages in company ability related CSR than when a company engages in company ability irrelevant CSR. We discuss our experimental set up and its results in Section 6.

Therefore, if Firm 1 pursues CSR-CA consumers know that the firm's R&D capability is now equal to one and as a result they do not gain from the contrast effect (i.e., *expected R&D capability* = 1). On the other hand, if Firm 1 pursues CSR-NCA strategy its R&D capability does not change and consumers gain $\lambda\theta(1 - x)$ from the contrast effect. When a firm does not pursue CSR and invests its money to train R&D, this does not become as public as investing in CSR, which is specifically done to improve the public opinion about the company and promoted by the company.³ Firms constantly invest in R&D, by such as hiring more employees or providing

²We conduct our analysis for $\lambda < 1$ so that the impact of contrast effect on the consumer's utility is not larger than the absolute utility θ .

³Forexample, every year Lee jeans celebrates Lee national denim day on first Friday of October and invites companies to have their employees wear jeans to work one day and donate for breast cancer fund. Procter & Gamble's Oly brand skin-care line partnered with American society for Dermatologic surgery, and it was

additional training to its employees, and unless the act of investing in R&D is public by its nature such as merging with or acquiring another company consumers do not become aware of the investment. In fact, even a merger or an acquisition may not attract attention of an ordinary consumer, as a CSR action would do, unless it is done with a high profile company. Therefore, we assume that pure R&D investment is not observable to the consumers and hence if consumers do not observe the firm investing in any type of CSR (i.e., when the firm invests in pure R&D), they do not update their prior belief about the firm’s R&D capability. This means that when the firms pursue NCSR, consumers’ gain from the contrast effect is in the amount of $\lambda\theta(1 - x)$. In Section 7 we discuss an alternative way of modeling consumers’ posterior belief about the firm’s R&D capability when the firm pursues NCSR as well.

Table 3 lays out consumers’ utility from Firm 1’s new product and from Firm 2’s new product under different CSR strategies.⁴ Recall that Firm 2 is allowed to pursue only NCSR.

Table 1: Consumers’ utility from new products under various CSR strategies

Consumers’ utility from:	NCSR	CSR-CA	CSR-NCA
Firm 1’s new product	$\nu + \theta + \lambda\theta(1 - x) - p_1$	$\nu + \theta + \gamma - p_1$	$\nu + \theta + \lambda\theta(1 - x) + \gamma - p_1$
Firm 2’s new product	$\nu + \theta + \lambda\theta(1 - y) - p_2$		

Let $R \equiv \frac{\gamma}{\theta\lambda}$. Note that $\frac{\gamma}{\theta}$ is the relative gain from CSR and $\frac{\lambda\theta}{\theta}$ is the relative gain from the contrast effect. Therefore, R denotes the ratio of relative gain from CSR to the relative gain from the contrast effect. Firms’ profits are given in Tables 2 to 5 for both case of Firm 1 is more capable than Firm 2 (i.e., $x > y$) and case of Firm 1 is less capable than Firm 2 (i.e., $x < y$).

Case of $x > y$:

Table 2: Firm 1’s Profit When $x > y$

Firm 1’s profit if it pursues:		
NCSR	CSR-CA	CSR-NCA
0	$\gamma - \lambda\theta(1 - y)$ if $R > (1 - y)$ 0 if $R < (1 - y)$	$x(\gamma - \lambda\theta(x - y))$ if $R > (x - y)$ 0 if $R < (x - y)$

widely covered in tv, print and online media. Coca-Cola India Inc.’s recent “Drops of Joy” campaign features an emotional narrative from one of the 80 men of the Benares Deaf and Dumb Institute who have been given employment as bottle inspectors at Coca-Cola’s bottling plant.

⁴Note that in our model when the firm invests in CSR-NCA, consumers who believe that the firm trades off R&D capability improvement for CSR-NCA investment do not react less positively and hence do not derive less utility from the new product. Sen and Bhattacharya (2001) test this hypothesis of whether consumers who believe that the firm trades off improving its R&D capability for CSR-NCA react less positively to the firm’s new product and found no support for such consumer behavior. That is why we ignore it in our model as well.

Recall that Firm 2 can only pursue NCSR.

Table 3: Firm 2's Profit When $x > y$

Firm 2's profit if Firm 1 pursues:		
NCSR	CSR-CA	CSR-NCA
$\lambda\theta(x - y)$	$\lambda\theta(1 - y) - \gamma$ if $R < (1 - y)$ 0 if $R > (1 - y)$	$(1 - x)\theta(1 + \lambda(1 - y)) + x(\lambda\theta(x - y) - \gamma)$ if $R < (x - y)$ $(1 - x)\theta(1 + \lambda(1 - y))$ if $R > (x - y)$

Case of $y > x$:


Table 4: Firm 1's Profits When $y > x$

Firm 1's profit if it pursues:		
NCSR	CSR-CA	CSR-NCA
$\lambda\theta(y - x)$	$\gamma - \lambda\theta(1 - y)$ if $R > (1 - y)$ 0 if $R < (1 - y)$	$x(\gamma + \lambda\theta(y - x))$

Table 5: Firm 2's Profits When $y > x$

Firm 2's profit if Firm 1 pursues:		
NCSR	CSR-CA	CSR-NCA
0	$\lambda\theta(1 - y) - \gamma$ if $R < (1 - y)$ 0 if $R > (1 - y)$	$(1 - x)\theta(1 + \lambda(1 - y))$

4 Benchmark Case: Firm 2 cannot invest in CSR

In this section we analyze the benchmark case in which Firm 2 cannot respond to Firm 1 by investing in CSR. Later, in Section 5 we extend our analysis to the case in which Firm 2 can invest in CSR as well. By comparing the outcomes of  cases, we will be able to study how a firm (i.e., in our model Firm 1) can use CSR strategically not just to affect consumers' willingness to pay for its product, but also to alter its rival's actions.

We begin by first analyzing the case of no contrast effect. The reason we are doing so is to understand whether the contrast effect has any significant impact on the firm's CSR strategy.

Lemma 1 *When $\lambda = 0$, Firm 1 prefers to pursue CSR-CA.*

When Firm 1 invests in CSR-CA, its R&D success probability increases to one and consumers' willingness to pay for its new product increases by γ (i.e., due to CSR). In the absence of the

contrast effect, when the firm pursues CSR-NCA consumers' willingness to pay for its new product increases by γ and when it pursues NCSR, its R&D success probability increases to one. Therefore, it is obvious that CSR-CA dominates both of the other strategies.

Next, we investigate two cases: Firm 1 is more capable than Firm 2 (i.e., $x > y$) and Firm 1 is less capable than Firm 2 (i.e., $x < y$).

We conduct the rest of our analysis with contrast effect present, that is, for $\lambda > 0$. In the following we first characterize the equilibrium for $x > y$ case.

Lemma 2 *There exists a \underline{R} such that for $R < \underline{R}$ Firm 1 receives zero profits when it pursues any of the three strategies.*

Recall that Firm 2 can only pursue NCSR. Furthermore, since $x > y$ Firm 2 always has the contrast effect advantage. Therefore, if R is too low Firm 1 will not have any competitive advantage regardless of whichever strategy it pursues and thus, receive zero profits. For that reason, to make our analysis meaningful we assume that $R > \underline{R}$.

Proposition 1 *There exists a R^* such that Firm 1 chooses to pursue CSR-CA if $R > R^*$ and CSR-NCA otherwise.*

When $\lambda > 0$, if Firm 1 invests in CSR-NCA or NCSR, it benefits from the contrast effect. Specifically, since consumers think that the firm's R&D success probability is equal to x the gain for consumers from the contrast effect is equal to $\lambda\theta(1 - x)$. However, if Firm 1 pursues NCSR it receives zero profits. Remember that the rival is also doing NCSR. This means that both firms will develop the new product with probability one. Since $x > y$, consumers' gain from the contrast effect when they buy Firm 2's product is higher than when they buy Firm 1's product. Therefore, Firm 1 will have no competitive advantage when it launches the new product. Regardless of Firm 1 pursuing either CSR strategy, since $x > y$, consumers' gain from the contrast effect when they buy Firm 2's product (i.e., $\lambda\theta(1 - y)$) is higher than when they buy Firm 1's product. But, Firm 1's disadvantage from the contrast effect is lower when it pursues CSR-NCA than when it pursues CSR-CA (i.e., $\lambda\theta(x - y)$ vs. $\lambda\theta(1 - y)$). On the other hand, when Firm 1 pursues CSR-CA (CSR-NCA) it enjoys the gain from CSR with probability one (x). This means that if the gain from CSR (γ) is significantly higher than the loss in the contrast effect ($\lambda\theta(1 - x)$) then Firm 1 prefers to invest in CSR-CA. In other words, if the ratio of relative

gain from CSR to the relative gain from the contrast effect is high enough Firm 1 prefers to invest in CSR-CA and otherwise, Firm 1 prefers to invest in CSR-NCA.

The next proposition characterizes the equilibrium for $x < y$ case.

Proposition 2 *There exist x^* , R_1 , R_2 , and R_3 such that*

- *for $x > x^*$, Firm 1 pursues CSR-CA if $R > R_1$, CSR-NCA if $R_1 > R > R_2$, and NCSR if $R_2 > R$*
- *for $x < x^*$, Firm 1 pursues CSR-CA if $R > R_3$ and NCSR otherwise.*

Unlike in the case of $x > y$, now Firm 1 benefits from the contrast effect in the amount of $\lambda\theta(y-x)$ when it invests in CSR-NCA or in NCSR. That is why, in case of $x < y$ NCSR becomes a viable strategy. Following the same logic as in Proposition 1, when the gain from CSR is much higher than the gain from the contrast effect (i.e., for high enough R values) CSR-CA dominates CSR-NCA and NCSR. On the other hand, for lower R values, Firm 1 prefers either CSR-NCA or NCSR so that it can gain from the contrast effect. Recall that Firm 1's R&D success probability is equal to one (x) when it pursues NCSR (CSR-NCA). Thus, if the ratio of the relative gain from CSR to the relative gain from the contrast effect (i.e., R) is low enough then Firm 1 prefers to pursue NCSR to increase its chances to gain from the contrast effect. However, for medium R values and not so low x values it prefers to invest in CSR-NCA.

5 Both firms can invest in CSR

Now, recall that in Section 4, we have investigated the case in which the firm (i.e., Firm 1) can strategically use CSR to increase the consumers' willingness to pay for its new product and assumed that the rival (i.e., Firm 2) cannot respond by investing in CSR. In this section, we relax the assumption that Firm 2 cannot invest in CSR and modify our timeline as follows. At $t=1$ Firm 1 decides whether to invest in CSR and if so what kind of CSR. At $t=2$ Firm 2 decides whether to invest in CSR and if so what kind of CSR. At $t=3$ firms' R&D outcomes are realized and they simultaneously set their prices. Finally, at $t=4$ consumers make their purchasing decision. This way the firm will be able to use CSR to alter the rival's CSR strategy as well. Please see Figure 2 for detail timeline of the extended game.

Figure 2: Timeline of The Game - Both Firms Can Invest in CSR

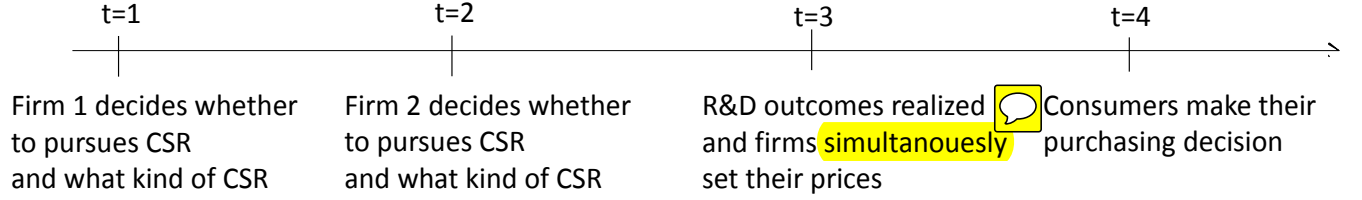


Table 6 lays out consumers' utility from Firm 1's new product and from Firm 2's new product under different CSR strategies.⁵

Table 6: Consumers' utility from new products under various CSR strategies - both firms can invest in CSR

Consumers' utility from:	NCSR	CSR-CA	CSR-NCA
Firm 1's new product	$\nu + \theta + \lambda\theta(1 - x) - p_1$	$\nu + \theta + \gamma - p_1$	$\nu + \theta + \lambda\theta(1 - x) + \gamma - p_1$
Firm 2's new product	$\nu + \theta + \lambda\theta(1 - y) - p_2$	$\nu + \theta + \gamma - p_2$	$\nu + \theta + \lambda\theta(1 - y) + \gamma - p_2$

As we did in Section 4 we investigate two cases: Firm 1 is more capable than Firm 2 (i.e., $x > y$) and Firm 1 is less capable than Firm 2 (i.e., $x < y$). For the sake of space we provide firms' profits in the Appendix.

First, we characterize the equilibrium for $x > y$ case.

Lemma 3 *There exists a \hat{R} such that for $R < \hat{R}$ Firm 1 receives zero profits when it pursues any of the three strategies.*

Since $x > y$ Firm 2 always has the contrast effect advantage. If R is too low, for any strategy Firm 1 chooses to pursue, NCSR becomes the dominant strategy for Firm 2. In this case, due to the gain from the contrast effect consumers prefer to buy Firm 2's new product and thus, Firm 1 receives zero profit regardless of the strategy it pursues. For that reason, to make our analysis meaningful we assume that $R > \hat{R}$.

Proposition 3 *There exists a \hat{R} such that Firm 1 pursues CSR-CA if $R > \hat{R}$ and NCSR otherwise. Firm 2 always pursues CSR-NCA.*

⁵We would like to note that as in Section 4, if λ were equal to zero then Firm 1 would prefer to pursue CSR-CA. In this case, Firm 2 would receive zero profit regardless of the strategy it pursues and hence the firm would be indifferent in pursuing any of the three strategies. If we think that Firm 2 would not invest in any of the strategies then CSR-CA would be the dominant strategy for Firm 1.


According to Proposition 3, interestingly, when the rival is also capable of investing in CSR, Firm 1 does not prefer to invest in CSR-NCA and for Firm 2 CSR-NCA is the dominant strategy. Why does this happen? Unlike the benchmark case, if R is high enough then when Firm 1 invests in CSR-NCA, Firm 2 responds to that by investing in CSR-CA. Since R is high enough Firm 2 would like to benefit from CSR effect as much as possible. Given that Firm 1 is pursuing CSR-NCA and hence will be successful only with probability x , CSR-CA is the best strategy for Firm 2. On the other hand, when Firm 1 invests in CSR-CA, Firm 2 responds to that by investing in CSR-NCA. Firm 2 would do so because it would like to pursue one of the CSR strategies, but if it pursues CSR-CA it will not have any competitive advantage over the rival (i.e., the firms will be identical). In the former case, Firm 1 will be successful in R&D with probability x and benefit only from the contrast effect. However, in the latter case, Firm 1 will be successful in R&D with probability one and with probability $(1 - y)$ the rival will fail and as a result, Firm 1 will benefit from CSR effect. For that reason, for high enough R values Firm 1 prefers to pursue CSR-CA. If R is low, when Firm 1 invests in CSR-NCA, Firm 2 responds to that by investing in NCSR. Firm 2 would do so because it will gain more from the contrast effect than the CSR effect and by pursuing NCSR rather than CSR-NCA it increases its chances of benefitting from the contrast effect. On the other hand, when Firm 1 invests in NCSR, Firm 2 responds to that by investing in CSR-NCA. Firm 2 would like to benefit from the contrast effect as much as possible given that R is low enough; however as R cannot be too low ($R > \hat{R}$, see Lemma 3) the firm can benefit from the CSR effect by investing in CSR-NCA. In the former case, since $x > y$ Firm 1 will only benefit from CSR effect with probability x . However, in the latter case, Firm 1 will benefit from the contrast effect when Firm 2 fails, which happens with probability $(1 - y)$. For low enough R values, the gain from the contrast effect dominates the gain from the CSR effect and hence, Firm 1 prefers to pursue NCSR.

The next proposition characterizes the equilibrium for $x < y$ case.

Proposition 4 *There exist \hat{x} , \hat{R}_1 , \hat{R}_2 , \hat{R}_3 , \hat{R}_4 , and λ^* such that*

- *for $x > \hat{x}$ and $\lambda > \lambda^*$, Firm 1 pursues CSR-CA and Firm 2 pursues CSR-NCA if $R > \hat{R}_1$, Firm 1 pursues CSR-NCA and Firm 2 pursues CSR-CA if $\hat{R}_1 > R > \hat{R}_2$, Firm 1 pursues CSR-NCA and Firm 2 pursues NCSR if $\hat{R}_2 > R > \hat{R}_3$, and Firm 1 pursues NCSR and Firm 2 pursues CSR-NCA if $R < \hat{R}_3$*

- for $x < \hat{x}$ or $\lambda < \lambda^*$, Firm 1 pursues CSR-CA if $R > \hat{R}_4$ and NCSR otherwise. Firm 2 always pursues CSR-NCA.

Proposition 4 shows that  shows that, unlike the benchmark case, when Firm 2 can invest in CSR as well, Firm 1 may not pursue CSR-NCA even if x is high (i.e., if $x > \hat{x}$ and $\lambda < \lambda^*$). The intuition for this outcome is as follows. First, note that for these parameter values Firm 1's gain from the contrast effect (which is equal to $(1 - x)\lambda$ if Firm 2 invests in CSR-CA or $(y - x)\lambda$ if Firm 2 invests in CSR-NCA or NCSR) is small. For high enough R values, if Firm 1 pursues CSR-NCA then Firm 2 will pursue CSR-CA. In this case, Firm 1 is able to develop the new product successfully with probability x and as a result will collect the contrast effect gain $((1 - x)\lambda)$. However, if Firm 1 pursues CSR-CA then, given that R is high enough Firm 2 will pursue CSR-NCA. In this case, with probability one Firm 1 will successfully develop the new product and benefit from the CSR effect when Firm 2 fails (this happens with probability $1 - y$). Obviously, when x is high enough and λ is low enough the gain from the CSR effect dominates the gain from the contrast effect and as a result, Firm 1 prefers to pursue CSR-CA rather than CSR-NCA. For low R values, if Firm 1 pursues CSR-NCA then Firm 2 will pursue NCSR. In this case, Firm 1 is able to develop the new product successfully with probability x and as a result will obtain the contrast effect gain (the expected gain from the contrast effect is equal to $x(y - x)\lambda$). However, if Firm 1 pursues NCSR then Firm 2 will pursue CSR-NCA. Thus, with probability one Firm 1 will successfully develop the new product and benefit from the contrast effect gain (the expected gain from the contrast effect is equal to $y(y - x)\lambda + (1 - y)(1 - x)\lambda$). Since the expected gain from the contrast effect under NCSR is higher than under CSR-NCA Firm 1 prefers to invest in NCSR.

Note that according to Proposition 4, interestingly there exist parameter values for which Firm 1, i.e., the firm with lower R&D capability, invests in CSR-NCA while Firm 2, i.e., the firm with higher R&D capability, invests in CSR-CA or NCSR. This means that the firm with lower R&D capability prefers to spend its resources not to improve its R&D capabilities and increase its chance to successfully develop the new product, but to increase the value of its product for consumers. This happens when x and λ are high and R is in medium range. By doing this Firm 1 is benefitting from both the contrast effect and the CSR effect as much as possible, but taking the risk of failing in R&D. However, since x is high enough the risk of failing in R&D is not so high. Furthermore, since λ is high the gain from the contrast effect is high and since R is in

medium range the gain from the CSR effect is also significant. Note that if R were high then Firm 1 would prefer to pursue CSR-CA so that it would increase its chances of benefitting from the CSR effect at the expense of the gain from the contrast effect.

Tables 7-9 summarize the optimal CSR strategy depending on firms' relative R&D competence, the ratio of relative gain from CSR to the relative gain from the contrast effect (R), and the contrast effect sensitivity (λ).

Table 7: Firm 1 is more capable than Firm 2

R	High	Low
CSR Strategy	Firm 1: CSR-CA Firm 2: CSR-NCA	Firm 1: NCSR Firm 2: CSR-NCA

Table 8: Firm 1 is less capable than Firm 2

Contrast Effect Sensitivity - High				
R	High	Medium	Low	Very Low
CSR Strategy	Firm 1: CSR-CA Firm 2: CSR-NCA	Firm 1: CSR-NCA Firm 2: CSR-CA	Firm 1: CSR-NCA Firm 2: NCSR	Firm 1: NCSR Firm 2: CSR-NCA
Contrast Effect Sensitivity - Low				
R	High		Low	
CSR Strategy	Firm 1: CSR-CA Firm 2: CSR-NCA		Firm 1: NCSR Firm 2: CSR-NCA	

Table 9: Firm 1 is much less capable than Firm 2

R	High	Low
CSR Strategy	Firm 1: CSR-CA Firm 2: CSR-NCA	Firm 1: NCSR Firm 2: CSR-NCA

Therefore, our results provide a roadmap regarding when and what type of CSR firms should invest in. It is obvious that neither type of CSR is dominant strategy. Our results reveal that it is not enough to pursue a CSR that consumers will appreciate and the decision regarding what type of CSR to pursue should not be random. Unless consumers punish firms severely for not engaging in CSR (i.e., unless the cost of not doing CSR is too high) sometimes it is even better not to engage in CSR. We would like to note that unlike in the previous analytical papers, in our model it is not the high cost of CSR that discourages a firm to engage in CSR. Our model goes beyond the cost-based explanation and outlines a strategic reason for not to invest in CSR, which is via the effect of CSR on consumers' perception of the firm's R&D capability.

After characterizing the optimal firm strategies in the following we investigate whether being a first mover in CSR is always advantageous or not and whether the firm with an R&D disadvantage can overcome its competitive disadvantage by being a first mover in CSR.

Proposition 5 *Firm 1's (the first mover) expected profits are higher than Firm 2's unless $y > x > \hat{x}$, $\lambda > \lambda^*$, and $\hat{R}_1 > R > \hat{R}_3$. Firm 2's (the follower) expected profits are higher than Firm 1's if $y > x > \hat{x}$, $\lambda > \lambda^*$, and $\hat{R}_1 > R > \hat{R}_3$.*

According to Proposition 5, it is not always advantageous to be a first mover in CSR. Note that as we know from Proposition 4 for $y > x > \hat{x}$, $\lambda > \lambda^*$, and $\hat{R}_1 > R > \hat{R}_3$ Firm 1 prefers to pursue CSR-NCA and in all other possible regions it pursues either CSR-CA or NCSR. Therefore, Proposition 5 implies that if the optimal strategy for the first mover is to pursue CSR-CA, not CSR-NCA, then being first mover in CSR is advantageous and furthermore, the firm with an R&D disadvantage (i.e., competitively disadvantage) can overcome this and be more profitable than the rival by being the first mover in investing in CSR. Naturally, one wonders why this cannot happen when the optimal strategy for the first mover is CSR-NCA. For $y > x > \hat{x}$, $\lambda > \lambda^*$, and $\hat{R}_1 > R > \hat{R}_3$, Firm 1 invests in CSR-NCA and Firm 2 invests in CSR-CA or in NCSR. Thus, in the former case Firm 1 does not benefit from the CSR effect, but just from the contrast effect $((1 - x)\lambda)$ with probability x . However, Firm 2 will succeed in R&D with probability one and when Firm 1 fails (happens with probability $1 - x$), it will receive monopoly profits and benefit from the CSR effect as well. Given that this case happens when R is high enough ($R > \hat{R}_2$), Firm 2's expected profit is higher than Firm 1's expected profit. In the latter case, Firm 2 will succeed in R&D with probability one and when Firm 1 fails (happens with probability $1 - x$), it will receive monopoly profits and benefit from the contrast effect as well. Since this case happens for lower R values ($\hat{R}_2 > R > \hat{R}_3$), Firm 2's expected profit is higher than Firm 1's expected profit.

Proposition 6 *Firm 1 benefits from CSR more when $x < y$ than when $x > y$.*

So far, we have established that a firm (i.e., Firm 1 in our model) can use CSR strategically to affect both the consumers' willingness to pay for its product and the rival's actions. According to Proposition 6, a firm benefits from strategic CSR more when it has lower R&D capability than its rival. First, regardless of $x < y$ or $x > y$ for high R values the first mover invests in

CSR-CA and the follower invests in CSR-NCA and for low R values the first mover invests in NCSR and the follower invests in CSR-NCA. However, for medium R values the first mover may follow a different strategy depending on $x < y$ or $x > y$. Note that the more capable firm cannot gain from the contrast effect. That is why when $x > y$, CSR-CA strategy dominates CSR-NCA strategy for the upper medium values of R and NCSR strategy dominates CSR-NCA strategy for the lower medium values of R . In either case, as we know from Proposition 3, the follower pursues CSR-NCA. Therefore, in the upper medium R values, the first mover only benefits from the CSR effect when the follower fails to develop the new product. But, as we know from Proposition 4, the less capable first mover (i.e., $x < y$) prefers to invest in CSR-NCA for these medium R values if x and λ are high enough. In that case, the follower chooses to pursue CSR-CA and as a result, the first mover will gain from the contrast effect with probability x . Since x and λ are high and R is not too high the first mover's expected profit is higher when $x < y$ than when $x > y$.

Next, we discuss the testable implications of our model and make suggestions for future empirical work.

5.1 Testable implications of the model

First, our theoretical model has three parameters that affect the normative predictions. First, we have the R&D success probability of each firm as x or y . The empirical measure for this can be R&D investments, the number of patents a firm has obtained, or product innovations. For example, Surroca et al. (2010) use the ratio of R&D expenses to a firm's total number of employees as the measure for R&D capability. Second parameter is γ , the increase in willingness to pay for a product due to CSR activity being performed by a firm. The measure for this can be attained either by a direct survey like a conjoint study or by observing average prices before and after CSR activities have been initiated. A dummy variable for CSR activity can capture the impact of CSR on price beyond attributes like advertising, product quality, etc. Finally, we have λ which measures sensitivity to the contrast effect. The contrast effect will be greater in less turbulent industries (those which do not often see innovations). This is because λ captures how sensitive consumers are to an R&D surprise. In more turbulent industries, where innovations are more frequent, the contrast effect will be smaller. So λ for consumer packaged goods will be more than that for tech industries. Hence it is fair to assume that λ , the measure of sensitivity

to contrast effect, is specific to an industry. Thus, we suggest that one can measure λ as the ratio of the number of innovations to the number of companies in an industry.

Once the values of these four parameters are measured one can test the following hypotheses:

1. A firm is better off in investing in CSR-CA when the ratio of $\frac{\gamma}{\lambda\theta}$ is high. Recall that θ is the value of the product innovation for consumers (i.e., consumers' willingness to pay for the updates/improvements in the product).


2. When the ratio of $\frac{\gamma}{\lambda\theta}$ is low, it is better for a firm to invest in CSR-NCA if the firm has higher R&D capability than its rival and the rival is not capable of investing in CSR and not invest in CSR at all otherwise. This means that the analysis should include a dummy variable for whether the firm's R&D capability is higher than the rival's or not.

3. It is more profitable to invest in CSR-NCA rather than in CSR-CA if the ratio of $\frac{\gamma}{\lambda\theta}$ is in medium values and the rival is more capable than the firm, but the firm's R&D capability is not so low either.

We would like to note that the empirical analysis should be done by controlling for the cost of not investing in CSR. Specifically, in some industries/markets there might be legal requirements to invest in CSR or investing in CSR may be a general norm and hence it may not be feasible for a firm not to engage in CSR at all. India for example has recently passed a law which requires companies to spend 2% of their net profit on activities related to CSR. Indonesia also has a law for companies carrying out activities in the natural resources sector to participate in environmental social responsibility program. In those cases when testing the hypothesis 2 above, one should test whether investing more than the minimum required amount in CSR is better or not.

6 Experiment

We designed an experiment to support a key assumption in our model regarding contrast effect. The key objective of our study was to test the impact of CSR-CA and CSR-NCA on consumers' target product evaluations. In our model we assume that consumers assess a new product developed by a firm who has invested in CSR-CA less favorably than a product developed by a company with CSR-NCA activities.

Pretest 

A pretest was conducted to validate our manipulation of CSR type. One hundred and forty-five MTurk participants from North America were randomly assigned to one of the following conditions.

In the CSR-CA condition, the scenario read “ZENET Corporation develops and manufactures electronic testing equipment. The company offers several consumer and industrial products. ZENET has recently initiated the Skill Enhancement Initiative for its women and minorities employees. This initiative provides training for the CURRENT employees in the use of the latest production and manufacturing technologies. This has made the female and minority employees **more comfortable** in their work environment. The turnover rate in this group has dropped to a meager 3%, as compared to industry average of 20%.”

In the CSR-NCA condition, participants saw the following scenario about the company. “ZENET Corporation develops and manufactures electronic testing equipment. The company offers several consumer and industrial products. ZENET has recently undertaken the Feed the Children Initiative in **Bangladesh** in an effort to provide breakfast and lunch at schools in major cities. In the schools where the initiative has been implemented, **attendance has improved** by 50% (as compared to a mere 40% in schools that do not have such initiatives) and over 70% of the children have gone ahead to High School.” (scenarios adapted from Brown and Dacin (1997)).

Next, participants rated the following three statements about the expected company productivity as a result of CSR investments on a 7-point scale. “I believe that such social responsibility actions have direct implications for the company’s ability.”, “I believe that such social responsibility efforts will improve the company’s productivity.”, “I believe that such social responsibility efforts will improve the firm’s technological innovativeness.” (1 = Strongly Disagree 7 = Strongly Agree). These measures were highly correlated ($\alpha = .84$) and we combined them into a productivity index. Finally, we assessed our respondents’ expectations from a new product by ZENET with the following item. “If ZENET launches a new product, I would expect it to be of a high quality” (1 = Strongly Disagree 7 = Strongly Agree).

As we expected, participants in the CSR-CA condition rated the productivity of the company to be significantly higher than those who were in the CSR-NCA condition, demonstrating that our manipulation works as intended (MCSR-CA = 5.25, SD = 1.14; MCSR-NCA = 4.69, SD = 1.24; $F(1, 143) = 8.32, p < .01$). Moreover, participants anticipate a significantly higher quality

product from a firm who invests in CSR-CA rather than CSR-NCA (MCSR-CA = 5.20, SD = 1.33; MCSR-NCA = 4.71, SD = 1.45; $F(1, 143) = 4.48, p = .04$).

Main Study

One hundred and fifty-two MTurk participants from North America were randomly assigned to one of the scenarios tested in the above pretest (CSR-CA vs. CSR-NCA). Next, all participants read a description about QUANTEK A25, a new product developed by ZENET Corporation. “QUANTEK A25 is a device that can measure and monitor basic vital statistics, including respiration, heart rate, blood pressure, and temperature. QUANTEK A25 has been examined in independent tests by Consumer’s Union, Consumer’s Digest magazine, and Underwriter’s Laboratory. Unit was rated **as average**. Users noted **some convenience** with the unit as it combines several functions into one small unit. Next we asked our respondents to take a moment and imagine they are on the market to buy such a product and rate the extent to which they agree with the following three statements on a 7-point scale. “My attitude towards QUANTEK 25 is bad/good; negative/positive; unfavorable/favorable.” These items were highly correlated ($\alpha = .83$). Therefore, we combined them into a new product evaluation index.

Results reveal that participants in the CSR-CA condition evaluated the new product less favorably than participants in the CSR-NCA condition (MCSR-CA = 3.38, SD = 1.24; MCSR-NCA = 4.27, SD = 1.22; $F(1, 150) = 20.83, p < .01$), demonstrating the expected contrast effect.

Discussion

In line with the literature on the contextual influence on target product evaluations, we have documented a contrast effect as a result of a discrepancy between the judgment standard and actual performance (Herr et al., 1983; Herr, 1986; Lynch et al., 1991). Our experiment shows that if a firm invests in CSR-CA, consumers believe that its productivity and manufacturing capabilities will improve; therefore a new product by the firm will be of a better quality than a product by a company with a CSR-NCA investment. When the new product is an average item, however, consumer evaluations are significantly less favorable when the product is by a firm that invests in CSR-CA. Note that contrast effects occur only after some deliberation that is needed to correct for the assimilatory power of the context (Herr, 1986; Meyers and Tybout, 1997). Exposure to extreme exemplars induces contrast effects since such exemplars alert participants and diminishes the biasing influence of the context (Herr et al., 1983). Therefore, when the new

product by the firm investing in CSR-CA is rated as average, this results in a divergence from the expected, leading to contrast effects.

7 Conclusion

Our paper was motivated by the fact that firms in various markets spend significant amounts of money on corporate social responsibility (CSR) activities. However, it is not clear from the current literature if it is always profitable for the firm to invest in CSR activities. This paper therefore sets out to address this fundamental question.

Broadly, there are two main types of CSR activities, company ability relevant (CSR-CA) and company ability irrelevant CSR (CSR-NCA). Consumers' willingness to pay for a firm's products increases when they observe that the firm invests in CSR, of either type. But, when a firm invests in CSR-CA, it helps to improve the firm's R&D and manufacturing capabilities, which in turn increases the firm's success probability in new product development. On the other hand, CSR-NCA does not influence corporate ability. Unlike CSR-NCA, CSR-CA has two conflicting effects on a consumer's utility. While the direct effect (i.e., willing to pay extra for the product which is produced by a firm that invests in CSR) is positive, the indirect effect (i.e., the contrast effect) is negative due to the increase in consumers' expectation of the firm's ability to develop a higher quality new product. When a firm is deciding whether to invest in CSR and if so, of what kind, it should take into consideration how its decision will affect its R&D capability and as a result consumers' willingness to pay for its new product. This implies that if a firm ignores the indirect effect of CSR it may make an inefficient CSR decision, which can lead to reduced profits.

We construct an analytical model in which there are two firms, with asymmetric R&D capabilities, working on developing a new product. Each firm has a fixed budget to spend either on pure R&D or on CSR activity. We analyze two scenarios; one where the rival can only invest in R&D whereas the focal firm can choose between R&D and CSR of either type, second where both firms can choose between R&D and CSR of either type.

If there is no contrast effect CSR-CA is the dominant strategy for the focal firm. With the contrast effect present and the rival firm unable to invest in CSR, if the focal firm is more capable in R&D than the rival, it prefers to pursue CSR-CA if the relative gain from CSR is higher than the relative gain from the contrast effect and CSR-NCA otherwise. When the focal firm is less

capable than the rival, unless its R&D capability is too low, it pursues CSR-CA if the ratio of the relative gain from CSR to the relative gain from the contrast effect is high, CSR-NCA if the ratio of the relative gain from CSR to the relative gain from the contrast effect is medium, and NCSR if the ratio of the relative gain from CSR to the relative gain from the contrast effect is low. However, when the firm is less capable than the rival and its R&D capability is low enough, it prefers to pursue CSR-CA if the relative gain from CSR is higher than the relative gain from the contrast effect and NCSR otherwise. When the rival can invest in CSR, we find that the firm tends to abandon CSR-NCA strategy. Specifically, when the firm is more capable in R&D than the rival, it prefers to pursue CSR-CA if the relative gain from CSR is higher than the relative gain from the contrast effect and NCSR otherwise. When the firm is less capable and its R&D capability is not too low it will not pursue CSR-NCA, unless the consumers' sensitivity to contrast effect is high enough. In this case, it pursues CSR-CA if the relative gain from CSR is higher than the relative gain from the contrast effect, and NCSR otherwise. Thus, our results reveal that a firm can strategically use CSR to alter both consumer's behavior as well as a competitor's behavior. We observe that only under certain conditions it is advantageous to be a first mover in CSR-investment and under these conditions by being the first mover in CSR-investment the firm can even overcome its competitive disadvantage in R&D. Our analysis additionally reveals that the competitively disadvantaged firm benefits from CSR more than the competitively advantaged firm.

7.1 Limitations and Directions for Further Research

In our model we assume that when a firm pursues NCSR consumers do not update their prior belief about that firm's R&D capability. We could have alternatively modeled such that a firm receives an R&D endowment with some probability, which is unobservable to consumers unless the firm engages in CSR or truthfully reveals this. In that case, the rival may or may not know whether the firm has received an R&D endowment. In the former case, due to the gain from the contrast effect unless the firm finds it profitable to invest in CSR it would never prefer to reveal that it has received an R&D endowment. However, the rival's CSR strategy may reveal to the consumers whether the firm has received an R&D endowment and is pursuing NCSR. Since the rival prefers the firm not to benefit from the contrast effect this signaling feature of its own CSR strategy may affect its decision. This means that unless the rival's action reveals whether the

firm is pursuing NCSR, for consumers the probability of the firm pursuing NCSR would be less than one. If the rival does not know whether the firm has received an R&D endowment then the firm would be concerned about whether to reveal or not that it is pursuing NCSR. Even though the firm does not want to reveal to the consumers that it is pursuing NCSR to benefit from the contrast effect it may want its rival to know this so as to affect the rival's choice of strategy to its favor. Naturally, if there is no way of credibly communicating that the firm is pursuing NCSR strategy then for consumers the probability of the firm pursuing NCSR would be less than one. In either case, a firm's CSR strategy would have a signaling value regarding whether it has received an R&D endowment or not. This feature of the model would however immensely complicate the present analysis.

There are several directions in which this research can be taken further. We have modeled a Stackelberg game where the focal firm is the leader and the competitor is the follower. It would be meaningful to model a situation where the firms set their respective CSR strategies simultaneously, that is, neither firm learns what the other is doing prior to choosing its own strategy. We have also considered that the production costs for the products are symmetric across the two firms. It would be helpful to learn the role of costs in the CSR decision making process by building in cost heterogeneity in the model. When both firms can decide on whether to follow CSR or NCSR, the competitor learns of Firm 1's choice prior to making its own. The firm can credibly reveal that it has adopted CSR. If the firm does not reveal that it is doing CSR, then the default strategy is to pursue NCSR. Future research can consider mechanisms which would allow firms to credibly commit to either NCSR or one of those CSR strategies that we have discussed in this paper.

References

- Bagnoli, M. and S. G. Watts (2003). Selling to socially responsible consumers: Competition and the private provision of public goods. *Journal of Economics and Management Strategy* 12(3), 419–445.
- Baron, D. (2009). A positive theory of moral management, social pressure, and corporate social performance. *Journal of Economics and Management Strategy* 18(1), 7–43.

- Baron, D. P. (2001). Private politics, corporate social responsibility, and integrated strategy. *Journal of Economics and Management Strategy* 10(1), 7–45.
- Bauman, C. W. and L. J. Skitka (2012). Corporate social responsibility as a source of employee satisfaction. *Research in Organizational Behavior* 32, 63–86.
- Becchetti, L., A. Palestini, N. Solferino, and M. Tessitore (2014). The socially responsible choice in a duopolistic market: A dynamic model of ethical product differentiation. *Economic Modelling* 43, 114–123.
- Berens, G., C. Riel, and G. Bruggen (2005). Corporate associations and consumer product responses: The moderating role of corporate brand dominance. *Journal of Marketing* 69(3), 35–48.
- Beurden, P. V. and T. Gossling (2008). The worth of values- a literature review on the relation between corporate social and financial performance. *Journal of Business Ethics* 82, 407–424.
- Bhattacharya, C., S. Sen, and D. Korschun (2008). Using corporate social responsibility to win the war for talent. *MIT Sloan Management Review* 49(2), 37–44.
- Bhattacharya, C., S. Swain, and D. Korschun (2014). Corporate social responsibility, customer orientation, and the job performance of frontline employees. *Journal of Marketing* 78(3), 20–37.
- Bhattacharya, C. B. and S. Sen (2004). Doing better at doing good: When, why, and how consumers respond to corporate social initiatives. *California Management Review* 47(1), 9–24.
- Biehal, G. J. and D. A. Sheinin (2007). The influence of corporate messages on the product portfolio. *Journal of Consumer Psychology* 71(2), 12–25.
- Brammer, S., S. Brooks, and S. Pavelin (2006). Corporate social performance and stock returns: Uk evidence from disaggregate measures. *Financial Management* 35(3), 97–116.
- Brown, T. J. and P. A. Dacin (1997). The company and the product: corporate associations and consumer product responses. *Journal Of Marketing* 61(1), 68–84.

- Creyer, H. E. and W. T. Ross (1997). The impact of firm behavior on purchase intention: Do consumers really care about business ethics? *The Journal of Consumer Marketing* 14(6), 421–432.
- de Velde, E. V., W. Vermeir, and F. Corten (2005). Finance and accounting: Corporate social responsibility and financial performance. *Corporate Governance* 5(3), 129–137.
- Garcia-Gallego, A. and N. Georgantzis (2009). Market effects of changes in consumers' social responsibility. *Journal of Economics and Management Strategy* 18(1), 235–262.
- Gregory, A., R. Tharyan, and J. Whittaker (2014). Corporate social responsibility and firm value: Disaggregating the effects on cash flow, risk and growth. *Journal of Business Ethics* 124(4), 633–657.
- Griffin, J. J. and J. F. Mahon (1997). The corporate social performance and corporate financial performance debate: Twenty-five years of incomparable research. *Business and Society* 36(1), 5–31.
- Herr, P. M. (1986). Consequences of priming: Judgment and behavior. *Journal of Personal and Social Psychology* 51(6), 1106–1115.
- Herr, P. M., S. J. Sherman, and R. H. Fazio (1983). On the consequences of priming: Assimilation and contrast effects. *Journal of Experimental Social Psychology* 19(4), 323–340.
- Inoue, Y. and S. Lee (2011). Effects of different dimensions of corporate social responsibility on corporate financial performance in tourism-related industries. *Tourism Management* 32(4), 790–804.
- Iyer, G. and D. Soberman (2015). Social responsibility and product innovation. *Marketing Science*.
- Kim, H. M. (2006). Evaluations of moderately typical products: The role of within-versus cross-manufacturer comparisons. *Journal of Consumer Psychology* 16(1), 70–78.
- Klein, J. and N. Dawar (2004). Corporate social responsibility and consumers' attributions and brand evaluations in a product safety crisis. *International Journal of Research in Marketing* 21(3), 203–217.

- Krishna, A. and U. Rajan (2009). Cause marketing: spillover effects of cause-related products in a product portfolio. *Management Science* 55(9), 1469–1485.
- Luo, X. and C. B. Bhattacharya (2006). Corporate social responsibility, customer satisfaction, and market value. *Journal of Marketing* 70(4), 1–18.
- Lynch, J. G., D. Chakravarti, and A. Mitra (1991). Contrast effects in consumer judgments: Changes in mental representations or in the anchoring of rating scales? *Journal of Consumer Research* 18(3), 284–297.
- Margolis, J. D., H. A. Elfenbein, and J. P. Walsh (2009). Does it pay to be good and does it matter? meta analysis of the relationship between corporate social and financial performance. *Working Paper*.
- Margolis, J. D. and J. P. Walsh (2003). Misery loves companies: Rethinking social initiatives by business. *Administrative Science Quarterly* 48(2), 268–305.
- Maron, I. Y. (2006). Toward a unified theory of the csp-cfp link. *Journal of Business Ethics* 67(2), 191–200.
- McWilliams, A. and D. Siegel (2000). Research notes and communications - corporate social responsibility and financial performance: Correlation or misspecification. *Strategic Management Journal* 21(5), 603–609.
- Meyers, J. L. and A. M. Tybout (1997). Context effects at encoding and judgment in consumption settings: The role of cognitive resources. *Journal of Consumer Research* 24(1), 1–14.
- Mirvis, P. (2012). Employee engagement and csr: Transactional, relational, and development approaches. *California Management Review* 54(4), 93–117.
- Mohr, L. A. and D. J. Webb (2005). The effects of corporate social responsibility and price on consumer responses. *Journal of Consumer Affairs* 39(1), 121–147.
- Moore, G. M. (2001). Corporate social performance: An investigation in the uk supermarket industry. *Journal of Business Ethics* 34(3).
- Orlitzky, M., F. L. Schmidt, and S. L. Rynes (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies* 24(3), 403–441.

- Pen Schoen Berland (2010). *Corporate Social Responsibility Perceptions Survey*. Pen Schoen Berland.
- Rangan, K., L. Chase, and S. Karim (2015). The truth about csr. *Harvard Business Review*.
- Seifert, B., S. A. Marris, and B. R. Bartkus (2003). Comparing big givers and small givers: Financial correlates of company philanthropy. *Journal of Business Ethics* 45(3), 195–211.
- Seifert, B., S. A. Marris, and B. R. Bartkus (2004). Having, giving, and getting: Slack resources, corporate philanthropy, and firm financial performance. *Business and Society* 43(2), 135–161.
- Sen, S. and C. Bhattacharya (2001). Does doing good always lead to doing better? consumer reactions to corporate social responsibility. *Journal of Marketing Research* 38(2), 225–243.
- Shen, J. and J. Benson (2014). When csr is a social norm: How socially responsible human resource management affects employee work behavior. *Journal of Management* 20(10), 1–24.
- Soana, M. G. (2011). The relationship between corporate social performance and corporate financial performance in the banking sector. *Journal of Business Ethics* 104(1), 133–148.
- Surroca, J., A. J. Tribo, and S. Waddock (2010). Corporate responsibility and financial performance: The role of intangible resources. *Strategic Management Journal* 31(5), 463–490.
- Trudel, R. and J. Cotte (2009). Does it pay to be good. *MIT Sloan Management Review* 50(2), 61–68.
- Wright, P. and S. Ferris (1997). Agency conflict and corporate strategy: The effect of disinvestment on corporate value. *Strategic Management Journal* 18(1), 77–83.
- Wu, M. L. (2006). Journal of american academy of business. *Organization Studies* 8(1), 163–171.

Appendix

Proof of Lemma 1:

Since λ is zero when Firm 1 pursues any of the CSR strategies, consumer’s utility from its new product will be equal to $\nu + \theta + \gamma - p_1$ and when Firm 1 pursues NCSR, consumer’s utility from its new product will be equal to $\nu + \theta - p_1$. Note that when Firm 1 pursues CSR-CA or NCSR its R&D success probability is equal to one and when it pursues CSR-NCA its R&D success

probability is equal to x . Since Firm 2 can only pursue NCSR its R&D success probability is equal to one and consumer's utility from its new product will be equal to $\nu + \theta - p_2$. This means that if Firm 1 pursues NCSR then both firms' profits will be equal to zero. However, if Firm 1 pursues CSR-CA then its expected profit is equal to γ and if it pursues CSR-NCA its expected profit is equal to $x\gamma$. For that reason, Firm 1 prefers to invest in CSR-CA. \square

Proof of Lemma 2:

Since $x > y$ and Firm 2 is bound to pursue NCSR (that means consumer's utility from its new product will be equal to $\nu + \theta + \lambda\theta(1 - y) - p_2$) Firm 1 will never gain from the contrast effect. Therefore, when Firm 1 pursues NCSR, consumer's utility from its new product will be equal to $\nu + \theta + \lambda\theta(1 - x) - p_1$ and hence its profit will be equal to zero. However, if it invests in CSR-CA then consumer's utility from its new product will be equal to $\nu + \theta + \gamma - p_1$ and if it invests in CSR-NCA then consumer's utility from its new product will be equal to $\nu + \theta + \lambda\theta(1 - x) + \gamma - p_1$. Obviously, if $\gamma < \lambda\theta(x - y)$ then Firm 1 will receive zero profits from any of the three strategies. As a result, it would not want to spend its R&D endowment. Given that $R \equiv \frac{\gamma}{\theta\lambda}$, only for $R > \underline{R} = (x - y)$ Firm 1 would find it to profitable to pursue one of the three strategies. \square

Proof of Proposition 1:

As we show in the proof of Lemma 2 it is not profitable to pursue NCSR. If Firm 1 pursues CSR-CA then its expected profit is equal to $\gamma - \lambda\theta(1 - y)$ and if Firm 1 pursues CSR-NCA then its expected profit is equal to $x(\gamma - \lambda\theta(x - y))$. Therefore, Firm 1 prefers to invest in CSR-CA if $R > R^* = 1 + x - y$ and prefers to invest in CSR-NCA otherwise. \square

Proof of Proposition 2:

Firm 1's expected profit is $\pi_{CSR-CA,1} = \gamma - \lambda\theta(1 - y)$ if $R > 1 - y$ and $\pi_{CSR-CA,1} = 0$ otherwise, $\pi_{CSR-NCA,1} = x(\gamma + \lambda\theta(y - x))$, and $\pi_{NCSR,1} = \lambda\theta(y - x)$ when it pursues CSR-CA, CSR-NCA, and NCSR respectively.

One can show that if $x > \frac{y}{2}$: for $R > 1 + x - y$, $\pi_{CSR-CA,1} > \max\{\pi_{CSR-NCA,1}, \pi_{NCSR,1}\}$, for $1 + x - y > R > \frac{(1-x)(y-x)}{x}$, $\pi_{CSR-NCA,1} > \max\{\pi_{CSR-CA,1}, \pi_{NCSR,1}\}$, and for $\frac{(1-x)(y-x)}{x} > R$, $\pi_{NCSR,1} > \max\{\pi_{CSR-CA,1}, \pi_{CSR-NCA,1}\}$.

If $x < \frac{y}{2}$: for $R > 1 - x$, $\pi_{CSR-CA,1} > \max\{\pi_{CSR-NCA,1}, \pi_{NCSR,1}\}$ and for $R < 1 - x$, $\pi_{NCSR,1} > \max\{\pi_{CSR-CA,1}, \pi_{CSR-NCA,1}\}$. \square

Firms' Profits: For Lemma 3, Propositions 3 and 4

In the following we will provide firms' profit expressions and the solution for what is the best

strategy for a firm when its rival is pursuing NCSR, CSR-CA, or CSR-NCA respectively. By using this general characterization we will prove Lemma 3, and Propositions 3 and 4.

Let z_o and z_r denote own R&D capability and the rival's R&D capability respectively.

If the rival is pursuing NCSR:

Case of $z_r > z_o$: the firm's expected profit is $\pi_{CSR-CA} = \gamma - \lambda\theta(1 - z_r)$ if $R > (1 - z_r)$ and $\pi_{CSR-CA} = 0$ otherwise, $\pi_{CSR-NCA} = z_o(\gamma + \lambda\theta(z_r - z_o))$, and $\pi_{NCSR} = \lambda\theta(z_r - z_o)$.

Case of $z_o > z_r$: the firm's expected profit is $\pi_{CSR-CA} = \gamma - \lambda\theta(1 - z_r)$ if $R > (1 - z_r)$ and $\pi_{CSR-CA} = 0$ otherwise, $\pi_{CSR-NCA} = z_o(\gamma - \lambda\theta(z_o - z_r))$ if $R > (z_o - z_r)$ and $\pi_{CSR-NCA} = 0$ otherwise, and $\pi_{NCSR} = 0$.

What is the best strategy for a firm if the rival is pursuing NCSR?:

For $R > 1$: if $z_r > z_o$ then CSR-CA, if $z_o > z_r$ and $R > 1 + z_o - z_r$ then CSR-CA, and if $z_o > z_r$ and $R < 1 + z_o - z_r$ then CSR-NCA.

For $1 > R > z_o$ and $z_o > \frac{1}{2}$: if $z_r > z_o$ and $R > 1 + z_o - z_r$ then CSR-CA, if $z_r > z_o$ and $R < 1 + z_o - z_r$ then CSR-NCA, and if $z_o > z_r$ then CSR-NCA.

If $z_o > R > \max\{1 - z_o, z_o - z_r\}$ and $z_o > \frac{1}{2}$ then CSR-NCA.

If $z_o - z_r > R > 1 - z_o$ and $z_o > \frac{1}{2}$ then the firm is indifferent because it receives zero revenues under each strategy. Thus, the firm should not invest at all.

For $1 - z_o > R$ and $z_o > \frac{1}{2}$: if $z_r > z_o$ and $R > \frac{(1-z_o)(z_r-z_o)}{z_o}$ then CSR-NCA, if $z_r > z_o$ and $R < \frac{(1-z_o)(z_r-z_o)}{z_o}$ then NCSR, if $z_o > z_r > z_o - R$ then CSR-NCA, and if $z_o - z_r > R$ then the firm should not invest at all.

For $z_o < \frac{1}{2}$ and $1 > R > 1 - z_o$: if $z_r > z_o$ and $R > 1 + z_o - z_r$ then CSR-CA, if $z_r > z_o$ and $R < 1 + z_o - z_r$ then CSR-NCA, if $z_o > z_r$ and $R > 1 + z_o - z_r$ then CSR-CA, if $z_o > z_r$ and $z_o - z_r < R < 1 + z_o - z_r$ then CSR-NCA, and if $z_o > z_r$ and $z_o - z_r > R$ then the firm should not invest at all.

For $z_o < \frac{1}{2}$ and $1 - z_o > R > z_o$: if $z_r > z_o$ and $R > \frac{(1-z_o)(z_r-z_o)}{z_o}$ then CSR-NCA, if $z_r > z_o$ and $R < \frac{(1-z_o)(z_r-z_o)}{z_o}$ then NCSR, and if $z_o > z_r$ then CSR-CA.

For $z_o < \frac{1}{2}$ and $z_o > R$: if $z_r > z_o$ and $R > \frac{(1-z_o)(z_r-z_o)}{z_o}$ then CSR-NCA, if $z_r > z_o$ and $R < \frac{(1-z_o)(z_r-z_o)}{z_o}$ then NCSR, if $z_o > z_r > z_o - R$ then CSR-NCA, and if $z_o - z_r > R$ then the firm should not invest at all.

If the rival is pursuing CSR-CA:

The firm's expected profit is $\pi_{CSR-CA} = 0$, $\pi_{CSR-NCA} = z_o\lambda\theta(1 - z_o)$, and $\pi_{NCSR} = \lambda\theta(1 -$

$z_o) - \gamma$ if $R < (1 - z_o)$ and $\pi_{NCSR} = 0$ otherwise.

What is the best strategy for a firm if the rival is pursuing CSR-CA?:

If $R > (1 - z_o)^2$ then CSR-NCA and $R < (1 - z_o)^2$ then NCSR.

If the rival is pursuing CSR-NCA:

Case of $z_r > z_o$: the firm's expected profit is $\pi_{CSR-CA} = (1 - z_r)(\theta + \gamma)$, $\pi_{CSR-NCA} = z_o((1 - z_r)(\theta + \lambda\theta(1 - z_o) + \gamma) + z_r\lambda\theta(z_r - z_o))$, and $\pi_{NCSR} = (1 - z_r)(\theta + \lambda\theta(1 - z_o)) + z_r(\lambda\theta(z_r - z_o) - \gamma)$ if $R < (z_r - z_o)$ and $\pi_{NCSR} = (1 - z_r)(\theta + \lambda\theta(1 - z_o))$ otherwise.

Case of $z_o > z_r$: the firm's expected profit is $\pi_{CSR-CA} = (1 - z_r)(\theta + \gamma)$, $\pi_{CSR-NCA} = z_o(1 - z_r)(\theta + \lambda\theta(1 - z_o) + \gamma)$, and $\pi_{NCSR} = (1 - z_r)(\theta + \lambda\theta(1 - z_o))$.

What is the best strategy for a firm if the rival is pursuing CSR-NCA?:

For $R > (1 - z_o)$: if $z_r > z_o$ and $\frac{\gamma}{\theta} > \frac{\lambda z_o(1 - z_o - z_r(1 - z_r)) - (1 - z_r)(1 - z_o)}{(1 - z_r)(1 - z_o)}$ then CSR-CA, if $z_r > z_o$ and $\frac{\gamma}{\theta} < \frac{\lambda z_o(1 - z_o - z_r(1 - z_r)) - (1 - z_r)(1 - z_o)}{(1 - z_r)(1 - z_o)}$ then CSR-NCA, and if $z_o > z_r$ then CSR-CA.

For $R < (1 - z_o)$: if $z_r > z_o + R$ and $\frac{\gamma}{\theta} > \frac{(1 - z_o)(1 - z_r + \lambda(1 - z_o - z_r(1 - z_r)))}{z_r + z_o(1 - z_r)}$ then CSR-NCA, if $z_r > z_o + R$ and $\frac{\gamma}{\theta} < \frac{(1 - z_o)(1 - z_r + \lambda(1 - z_o - z_r(1 - z_r)))}{z_r + z_o(1 - z_r)}$ then NCSR, if $z_o + R > z_r > z_o$ and $\frac{\gamma}{\theta} > \frac{(1 - z_r)(1 - z_o) + \lambda((1 - z_o)^2(1 - z_r) - z_o z_r(z_r - z_o))}{(1 - z_r)z_o}$ then CSR-NCA, if $z_o + R > z_r > z_o$ and $\frac{\gamma}{\theta} < \frac{(1 - z_r)(1 - z_o) + \lambda((1 - z_o)^2(1 - z_r) - z_o z_r(z_r - z_o))}{(1 - z_r)z_o}$ then NCSR, and if $z_o > z_r$ then NCSR.

Proof of Lemma 3:

If $x > (2 - y)y$ then for $R < (1 - y)^2$ Firm 1's expected profit from any of the three strategies is zero. If $x < (2 - y)y$ then for $R < \frac{(1 - y)(x - y)}{y}$ Firm 1's expected profit from any of the three strategies is zero. Note that $(1 - y)^2 > \frac{(1 - y)(x - y)}{y}$ if $x < (2 - y)y$ and $(1 - y)^2 < \frac{(1 - y)(x - y)}{y}$ otherwise. Thus, for Firm 1 to receive positive profit from at least one of the three strategies R has to be greater than $\hat{R} = \min \left\{ (1 - y)^2, \frac{(1 - y)(x - y)}{y} \right\}$. \square

Proof of Proposition 3:

For $x > (2 - y)y$ and $R > (1 - y)^2$ Firm 1 invests in CSR-CA and Firm 2 invests in CSR-NCA.

For $x < (2 - y)y$: if $R > (1 - x)$ Firm 1 invests in CSR-CA and Firm 2 invests in CSR-NCA and if $(1 - x) > R > \frac{(1 - y)(y - x)}{y}$ Firm 1 invests in NCSR and Firm 2 invests in CSR-NCA. \square

Proof of Proposition 4:

For $x > 1 - y$ and $\lambda > \frac{1 - y}{(1 - x)(x + y - 1)}$: if $R > \frac{x(1 - x) - \frac{(1 - y)}{\lambda}}{1 - y}$ Firm 1 invests in CSR-CA and Firm 2 invests in CSR-NCA, if $\frac{x(1 - x) - \frac{(1 - y)}{\lambda}}{1 - y} > R > (1 - y)$ Firm 1 invests in CSR-NCA and Firm 2 invests in CSR-CA, if $(1 - y) > R > \frac{\frac{1 - y}{\lambda} + 1 - y - x(1 - x)}{x}$ Firm 1 invests in CSR-NCA and Firm 2 invests in NCSR, and if $R < \frac{\frac{1 - y}{\lambda} + 1 - y - x(1 - x)}{x}$ Firm 1 invests in NCSR and Firm 2 invests in

CSR-NCA.

For $x > 1 - y$ and $\lambda < \frac{1-y}{(1-x)(x+y-1)}$: if $R > 1 - x$ Firm 1 invests in CSR-CA and Firm 2 invests in CSR-NCA and if $R < 1 - x$ Firm 1 invests in NCSR and Firm 2 invests in CSR-NCA.

For $x < 1 - y$: if $R > 1 - x$ Firm 1 invests in CSR-CA and Firm 2 invests in CSR-NCA and if $R < 1 - x$ Firm 1 invests in NCSR and Firm 2 invests in CSR-NCA. \square

Proof of Proposition 5:

Let π_1 and π_2 denote Firm 1's and Firm 2's expected profit respectively.

In equilibrium, Firm 1 pursues CSR-CA and Firm 2 pursues CSR-NCA if $x > (2 - y)y$ and $R > (1 - y)^2$, if $y < x < (2 - y)y$ and $R > 1 - x$, if $x < y < 1 - x$ and $R > 1 - x$, if $y > x > 1 - y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $R > \frac{x(1-x) - \frac{(1-y)}{\lambda}}{1-y}$, or if $y > x > 1 - y$, $\lambda < \frac{1-y}{(1-x)(x+y-1)}$, and $R > 1 - x$. In this case, $\pi_1 = (1 - y)(\theta + \gamma)$ and $\pi_2 = y(1 - y)\lambda\theta$. Since $1 + \frac{\gamma}{\theta} > y\lambda$, $\pi_1 > \pi_2$.

In equilibrium if Firm 1 pursues CSR-NCA and Firm 2 pursues CSR-CA if $y > x > 1 - y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $\frac{x(1-x) - \frac{(1-y)}{\lambda}}{1-y} > R > (1 - y)$. In this case, $\pi_1 = (1 - x)x\lambda\theta$ and $\pi_2 = (1 - x)(\theta + \gamma)$. Since $1 + \frac{\gamma}{\theta} > x\lambda$, $\pi_2 > \pi_1$.

In equilibrium Firm 1 pursues CSR-NCA and Firm 2 pursues NCSR if $y > x > 1 - y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $(1 - y) > R > \frac{\frac{1-y}{\lambda} + 1 - y - x(1-x)}{x}$. In this case, $\pi_1 = x(\gamma + \lambda\theta(y - x))$ and $\pi_2 = (1 - x)(\theta + (1 - y)\lambda\theta)$. Since $\frac{\frac{1-y}{\lambda} + 1 - y - x(1-x)}{x} > (1 - y)$, $\pi_2 > \pi_1$.

In equilibrium Firm 1 pursues NCSR and Firm 2 pursues CSR-NCA if $y > x > 1 - y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $\frac{\frac{1-y}{\lambda} + 1 - y - x(1-x)}{x} > R$, if $y > x > 1 - y$, $\lambda < \frac{1-y}{(1-x)(x+y-1)}$, and $1 - x > R$, if $x < y < 1 - x$ and $1 - x > R$, or if $x < (2 - y)y$ and $(1 - x) > R > \frac{(1-y)(x-y)}{y}$.

If $y > x > 1 - y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $\frac{\frac{1-y}{\lambda} + 1 - y - x(1-x)}{x} > R$ then $\pi_1 \geq (1 - y)(\theta + \lambda\theta(1 - x))$ and $\pi_2 \leq y(\gamma - \lambda\theta(y - x))$. Since $R < (1 - y)\lambda$, $\pi_1 > \pi_2$. If $y > x > 1 - y$, $\lambda < \frac{1-y}{(1-x)(x+y-1)}$, and $1 - x > R$ then $\pi_1 \geq (1 - y)(\theta + \lambda\theta(1 - x))$ and $\pi_2 \leq y(\gamma - \lambda\theta(y - x))$. Since $1 - x > R$, $\pi_1 > \pi_2$. If $x < y < 1 - x$ and $1 - x > R$ then $\pi_1 \geq (1 - y)(\theta + \lambda\theta(1 - x))$ and $\pi_2 \leq y(\gamma - \lambda\theta(y - x))$. Since $1 - x > R$, $\pi_1 > \pi_2$. If $y < x < (2 - y)y$ and $(1 - x) > R > \frac{(1-y)(x-y)}{y}$ then $\pi_1 = (1 - y)(\theta + \lambda\theta(1 - x))$ and $\pi_2 = y(\gamma + \lambda\theta(y - x))$. Since $1 - x > R$, $\pi_1 > \pi_2$. \square

Proof of Proposition 6:

As we know from the proof of Proposition 3, when Firm 1 is the more capable firm (i.e., $x > y$), it pursues CSR-CA if $x > (2 - y)y$ and $R > (1 - y)^2$ or if $x < (2 - y)y$ and $R > (1 - x)$. This means that Firm 1 pursues CSR-CA if $R > \max\{(1 - x), (1 - y)^2\}$. In this case, Firm 2 prefers to pursue CSR-NCA and hence $\pi_1 = (1 - y)(\theta + \gamma)$.

As we know from the proof of Proposition 4, when Firm 1 is less capable firm (i.e., $x < y$), it pursues CSR-CA if $x > 1-y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $R > \frac{x(1-x)-\frac{(1-y)}{\lambda}}{1-y}$, if $x > 1-y$, $\lambda < \frac{1-y}{(1-x)(x+y-1)}$, and $R > 1-x$, or if $x < 1-y$ and $R > 1-x$, and pursues CSR-NCA if $x > 1-y$, $\lambda > \frac{1-y}{(1-x)(x+y-1)}$, and $\frac{x(1-x)-\frac{(1-y)}{\lambda}}{1-y} > R > \frac{\frac{1-y}{\lambda}+1-y-x(1-x)}{x}$.

Therefore, if $R > \max \left\{ (1-x), \frac{x(1-x)-\frac{(1-y)}{\lambda}}{1-y}, (1-y)^2 \right\}$ then Firm 1 pursues CSR-CA both when $x < y$ and when $x > y$. In either case, Firm 2 prefers to pursue CSR-NCA and hence $\pi_1 = (1-y)(\theta + \gamma)$.

If $x > 1-y$ and $\lambda > \frac{1-y}{(1-x)(x+y-1)}$ then for $x > y$ and $R > \max \{1-x, (1-y)^2\}$ Firm 1 pursues CSR-CA, but for $x < y$ and $\frac{x(1-x)-\frac{(1-y)}{\lambda}}{1-y} > R > \max \{1-x, (1-y)^2\}$ Firm 1 pursues CSR-NCA. In the latter case, Firm 2 prefers to pursue CSR-CA and hence $\pi_1 = x(1-x)\lambda\theta$. One can show that $x(1-x)\lambda\theta > (1-y)(\theta + \gamma)$ for $\frac{x(1-x)-\frac{(1-y)}{\lambda}}{1-y} > R$.

If $y > x > 1-y$ and $\lambda > \frac{1-y}{(1-x)(x+y-1)}$ then for $(1-x) > R > \frac{\frac{1-y}{\lambda}+1-y-x(1-x)}{x}$ Firm 1 pursues CSR-NCA (for $R < \frac{\frac{1-y}{\lambda}+1-y-x(1-x)}{x}$ Firm 1 pursues NCSR), but if $x > y$ then for $R < (1-x)$ Firm 1 pursues NCSR. \square