Corporate Social Responsibility and Regulation: Taxing Ethical behaviour

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Abstract

This paper analyzes the impact of Corporate Social Responsibility in a monopoly setup and the implications of government intervention through a consumption tax or subsidy. Assuming that consumers have heterogeneous preferences regarding the CSR content of the private good they purchase and that their degree of altruism is positively related to their income, the paper assesses whether taxing CSR products could be welfare improving, when the tax revenues are recycled in the form of government provision of a public good that either substitutes for or complements the firm's CSR investments. We show that, when private and public investments are perfect substitutes, CSR activities should benefit from tax exemptions. However, when they are complements, the CSR products should be taxed when there is a sufficiently large marginal willingness to pay for such activities. Taxing the CSR product can then be viewed as a form of progressive taxation whereby more taxes are levied on wealthier consumers to make the public good available to everyone. Finally, we assess whether taxes on CSR goods disfavour the efficient producers or rather the inefficient ones, given different objectives of the regulator.

JEL classification: M14, H41, D6, H11, L21

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Contents

1 Introduction

The traditional view of how society should be organized has rested on two pillars. The invisible hand of the market harnesses consumers' and corporations' pursuit of self-interest to the pursuit of efficiency. The state corrects market failures whenever externalities stand in the way of efficiency and redistributes income and wealth, as the income and wealth distribution generated by markets has no reason to fit society's moral standards. From this perspective, it was only natural to think that the State is the sole provider of public goods as their provision is subject to free-riding problems and hence cannot be left in the hands of individuals. But recently, government failures have arised and society's demands for individual and corporate social responsibility as an alternative response to market and redistributive failures have become more prominent. Government failures can find its origins in the capture by lobbies and other interest groups. Governments under influence may fail to optimally correct externalities, or bend to wealthy agents' opposition to redistributive policies. Governments may also fall due to inefficiency, high transaction costs or poor information. So citizens and corporations empower themselves and substitute for elected government. The movement is gaining momentum and the Private Provision of Public Goods is being revisited.

Many public goods are privately provided either through direct contributions by individuals or by firms as part of their marketing or business strategy (what we call "Corporate Social Responsibility" practices). Provision of public goods using direct contributions has been studied extensively. In contrast, there has been relatively little work on private provision by firms. The economics literature on private provision of public goods has focused on the direct contributions mechanism. The general assumption of theoretical research in this area is that individuals choose between consumption of a private good and contributions to a pure public good. Yet individuals increasingly face a third option: consumption of impure public goods that generate private and public goods as a joint product. Markets for "socially responsible" goods and services exemplify the increased availability of impure public goods in the economy. The distinguishing feature of these markets is availability of impure public goods (or "responsible" goods) that arise through joint production of a private good and an environmental or social public good.

For example, consider the growing market for fair trade coffee, which is coffee produced under high social and environmental standards. The producers of fair trade coffee are paid a higher price than standard coffee in order to promote healthier working conditions for farmers and farm workers and fair wages. Fair trade premiums are then invested in community development projects like scholarship programs, healthcare services and quality improvement training. Consumers increasingly have the option to purchase fair trade coffee with a price premium. In return, production of fair trade coffee raises the living standards of farmers and farm workers and helps develop the community. Thus consumers of fair trade purchase a joint product—coffee consumption and community

development. Another example is the growing market for premium-priced products which are linked to a social cause. This is the case of cause-related marketing (explicitly linking the sale of a company's product to company contributions to worthy causes) and lump-sum corporate donations to or expenditures on worthy causes or green activities, which implicitly link the contribution to sales of the company's products. Thus consumers of such products also purchase a joint product —consumption of the private good and investment in the social cause embraced by the firm. In all these examples, the joint product forms an impure public good — with private and public characteristics. Firms producing the impure public goods will be referred to as *socially responsibly* firms.

This paper has been motivated by the ongoing discussion among economists about the market and welfare implications of Corporate Social Responsibility (CSR hereafter) or "A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on voluntary basis" (European Commission, 2001). This discussion was initiated by the rapid growth of firms whose products are strongly connected to social and ecological considerations. CSR activities being viewed as the corporate provision of a public good, it is a common practice in many economies that they enable tax exemptions. For instance, The Chilean government offers a variety of tax credits to corporations for charitable donations, most of which are oriented to support educational activities, such as schools, universities, and vocational institutions. Italy has introduced an ecolabelling scheme that provides the purchaser with a sales tax reduction on the purchase price of green products (Bell, 2002). In the U.S, tax exemptions are designed so as to promote the adoption of hybrid-electric vehicles (Diamond, 2009).The World Bank identifies those tax incentives as an effective means by which governments can fullfill their role in promoting CSR (Fox et al., 2002).

The present paper assesses whether these exemptions are necessarily optimal, given the nature of interdependence between the public good provided by the company and that provided through the government. For instance, should the same tax exemptions apply to a firm constructing a school for children in a poor neighbourhood and one that incorporates a number of billable hours for its employees to volunteer in public schools? Should the tax policy distinguish between a company donating to build a hospital for cancer patients and one that donates to paint the walls or provide complementary equipment for a public hospital?

The understanding of CSR has matured among both scholars and practicioners. It is about time the focus of the analysis and debates shifts from the *desirability* and *feasibility* of CSR to the *regulation* of CSR, to get the most out of it. Firms' intervention on the market to correct government failures is sometimes necessary, but so is the government's intervention to correct CSR failures and capitalize on its benefits. In doing so, the regulator ought to draw a clear distinction between the different practices, according to whether they complement or substitute for the government provision of the public good. A priori, companies investing in clean energy resources, reducing carbon footprint

or providing access to clean water in deprived areas and those enhancing work conditions for their employees or providing some paid staff time to charitable causes should receive a differential treatment, given the public policy objectives of course.
The objective of this study is then three-fold: (i) to understand the behaviour of both *responsible* consumers and producers, and what makes products associated with CSR *niche* products, (ii) to compare and analyze the effectiveness of tax (or subsidy) policies in promoting responsible products, and (iii) to provide guidelines for policy makers to determine the optimal way to intervene on a market with CSR activities, given the nature of interdependence between CSR and the public good provided through the government.

We consider a monopoly market for a final good where the firm engages in CSR activities in order to create a socially friendly image for its product. Building on the characteristics approach to consumers' behaviour, we assume that individuals derive utility from characteristics of goods rather than goods themselves. Individuals have the opportunity to consume a private good and make a contribution to a pure public good, with each activity generating its own characteristic, such that the same private and public characteristics are available jointly through consumption of an impure public good. Furthermore, we consider that consumers are homogeneous regarding the physical characteristics of the private good, but heterogeneous towards the valuation of the CSR aspects of the product. More socially conscious consumers have higher willingness to pay for the socially friendly good.

Consumers' *image concerns* behind such prosocial behaviour is also considered: the fewer the consumers that are purchasing the good, the higher the *prestige* from being one. Some socially responsible consumers then have a positive valuation for the product of the firm that engages in CSR activities and are willing to pay a higher price for the *socially friendly* good as they derive a warm-glow utility from contributing to the public good. This is the rationale why consumers show strong preference for fair trade coffee, even though this product is more expensive than other conventional coffee. Hence CSR is viewed here as a profit-maximizing strategy undertaken by the firm when customers are willing to sacrifice money (yield purchasing power) so as to further social goals. Put differently, we consider that CSR is a profitable practice when consumers have some demand for corporations to engage in philanthropy on their behalf.

Under this assumption, we set up our benchmark model, the *unregulated* scenario, assuming that the economy consists only of a monopolist and a unit mass of consumers interacting in the market without any policy intervention. We identify conditions under which the monopolist engages in CSR as well as the conditions under which CSR is welfare-improving compared to the benchmark case without CSR activities. Then, we extend the model to allow for a welfare-maximizing regulator to intervene by imposing a consumption tax and then providing a certain amount of the public good using the collected taxes. We contrast the optimal tax rate that would be set when the public and

private investments are substitutes and when they are complements.

Our main finding is that the regulator would always subsidize the monopolist if CSR investments and government provision are substitutes, whereas he would impose a positive tax, under certain conditions, when they are complements. Further, while efficient producers should be offered higher subsidies in the substitution case, they should be imposed larger taxes in the complementarity scenario. Comparing different objectives of the regulator, we find that the tax rate is the lowest under a benevolent regulator and the largest under a Leviathan-type government that aims at maximizing the tax revenues, with the tax rate set by a public-good maximizing regulator lying in between. Under all objectives of the regulator, efficient producers are disfavoured, in the sense that they are imposed larger taxes, when their CSR investments complement the public good provided by the government. However, when their investment substitutes for that of the government's, they are not necessarily worse off.

Literature Review

Our research draws on the confluence of three diverse streams of literature: private provision of public goods, strategic CSR and market outcomes and finally CSR and regulation.

Private Provision of Public Goods

The paper is related to the large literature on the private provision of public goods going back to the classic contributions by Bergstrom, Blume and Varian (1986). This examines when private action can lead to public goods provision even though there is an underlying free-rider problem. The standard pure public good model has only a private good and a pure public good. In the standard impure public good model, the characteristics of the impure public good are not available through any other means (Cornes and Sandler 1984, 1994). This setup has been extended in other models to enable provision of the public characteristic through direct donations (Vicary 1997, 2000), but the private characteristic of the impure public good remains otherwise unavailable. In contrast, Kotchen (2006) develops a model that applies when both characteristics of the impure public good are also available separately, so individuals typically have three relevant choices: a conventional pure private good, a direct donation to a pure public good, and a green or impure public version of the good that jointly provides characteristics of the other two choices.

In this paper, we use the standard impure public good model where the private good is linked to the provision of a pure public good and no direct donations are allowed. So, in a way, we view CSR here as a delegated philanthropy by the part of consumers. A question that seems to be in order here is: why people would want corporations to do good on their behalf, rather than doing it on their own or through charitable organizations, churches.. etc? Information and transaction costs are clearly important here. In theory, consumers could send money to directly supplement the income of workers in the coffee plantations supplying Starbucks. But they would have to be informed about the occurrence of

individual trades and contracts and their financial transfers would involve enormous transaction costs. Somehow, philanthropy must thus be delegated. It could perhaps be entrusted to some charitable organization, but transaction costs are still likely to be much lower if delegation goes through the corporation, which already is involved in a financial relationship with the workers.

Another argument for asking corporations to behave pro-socially is that the desired actions are often not about transferring income to less-favored populations, but about refraining from specific behaviours, such as polluting the environment; here there is no substitute for asking the firm to behave well when the state does not impose constraining regulations. A related case is when a firm draws on its technical expertise or exploits complementarities to deliver goods and services to those in need more efficiently than the governments or other philanthropic intermediaries could. Examples include a giant supermarket chain organizing relief convoys to a zone hit by a hurricane, or a large water-treatment utility setting up a program of digging water wells for poor, remote villages in a developing country.

Strategic CSR Our paper also contributes to the literature on strategic CSR, in the terminology of Baron (2001) and in the spirit of a "doing well by doing good" strategy (Bénabou and Tirole, 2010). Strategic CSR refers to the case where firms are assumed to be socially responsible because they anticipate a benefit from such a behaviour. In this sense, our work is related to the strand of theoretical literature that addresses conditions under which firms engage in CSR and its economics implications (see Crifo and Forget, 2014; Kitzmueller and Shimshak, 2012). In particular, our contribution is more closely related to theoretical research where CSR is a business strategy in imperfect competition that generates product differentiation or ameliorates information asymmetries between consumers and producers.

Baron (2001, 2003) examines CSR under the prism of the strategic choice between *public and private politics*. His main finding is that private politics and CSR affect the strategic position of a firm in an industry under the existence of activist consumers, who can boycott firms with non-socially friendly behaviour. In the same vein, Calveras et al. (2006), assuming a perfectly competitive supply of inputs, compare the effects of formal regulation to firms' incentives to provide socially friendly goods as a response to increased *activism* on behalf of consumers. McWilliams and Siegel (2001) model firms' incentives to engage in CSR activities in oligopolistic markets with homogeneous goods as a means of product differentiation.

In the same vein, a few papers study the *impact of strategic CSR on market outcomes* and social welfare in an oligopoly setting. Bagnoli and Watts (2003) examine the case in which an oligopolistic firm links the provision of a public good (such as CSR activities) to the sale of their private product, in the context of unit demands and homogeneous socially responsible consumers. They find that the provision of CSR by firms is negatively related to the number of the firms in the market and positively related to the consumers' willingness to pay for the supply of the public good. Another example of strategic CSR is the *cause-related marketing* analyzed by Polischuck and Firsov (2005), which is a

business strategy whereby firms bundle their products and brands with contributions to designated charities. They find that such strategy can be used as a price-discrimination tool. Furthermore, it channels to charity significant resources that would not be available otherwise due to high transaction costs of individual donations and thus contributes to social welfare.

Besley and Ghatak (2007) model firms as competing for socially responsible consumers by linking the provision of a public good - environmentally friendly or socially responsible activities - to sales of their private goods. They find that, in many cases, too little of the public good is provided, but under certain conditions, competition leads to excessive provision. Further, they conclude that there is generally a trade-off between more efficient provision of the private and the public good. They study strategic CSR under both Cournot and Bertrand competition and conclude that the level of private provision of the public good varies inversely with the competitiveness of the private-good market. We assume a monopolistic market so as to capture the firm's incentives to engage in CSR disregarding the strategic effect arising from market competition and study conditions under which CSR is welfare-improving.

CSR and Regulation The Literature on CSR and regulation has evolved along two parallel lines: eco-labeling and green tax policies. *Eco-labeling* analyzes the value of certified or noncertified claims that the product meets the objectives of green consumers. The literature on eco-labeling makes the assumption that the "social responsibility" attribute of a product is a credence good in the sense that consumers cannot actually monitor the firm's CSR activities. Hence, in the absence of a credible information disclosure mechanism about social responsibility attributes of the firm's products to consumers, firms will fail to persuade consumers about their true commitment to social values, thus, a "market for lemons" problem arises. Mitrokostas and Petrakis (2007) analyze the case where the regulator intervenes to solve this problem by proposing a certain standard of CSR effort to the firms and providing certification to the firms that comply with the standard. They find that government intervention actually increases total welfare since it gives both firms incentives to engage in CSR activities. In Manasakis et al. (2013), the analysis is extended to allow for different objectives of the regulator. The authors investigate the impact of alternative certifying institutions on firms' incentives to engage in costly CSR activities as well as their relative market and societal implications. They find that the CSR certification standard is the lowest under for-profit private certifiers and the highest under a Non Governmental Organization (NGO), with the standard of a welfare-maximizing public certifier lying in between. In this paper however we assume that the firm can credibly inform consumers about their CSR effort by using labels on their products or by publishing reports about their CSR activities, but compare different objectives of the regulator when setting a consumption tax on CSR products.

Much research has focused on the effectiveness of regulatory policies that consist in *imposing emission taxes* on some products and giving *subsidies to green products* to encourage environmentally responsible production. The public good in this context is the reduction of pollution. An interesting idea that emerges from the analysis of envi-

ronmental taxes is that of the *double dividend* (Pearce, 1991; Goulder, 1995; Bovenberg and De Mooij, 1994): a green tax reform or a tax swap whereby an ecotax (a positive tax on carbon dioxide emissions) is levied and the proceeds are devoted to decrease some other distortionary tax while keeping government income constant, may achieve a so-called double dividend, that is, an increase in (i) environmental quality – the so-called green dividend – and (ii) an increase in welfare from private commodities – the so called blue dividend. The double dividend hypothesis has been tested taking into account the different impacts an environmental tax may have, precisely and most relevant to our analysis, the case where the *proceeds of taxation are used to finance a public good*, that is a public pollution abatement activity (John et al., 1995) and taking into account the heterogeneity in households income, which translates into the *degree of regressivity in the environmental tax* (Chiroleu-Assouline and Fodha, 2014).

Although we do not use a general equilibrium model where the tax proceeds are recycled to reduce some other distortionary tax, our analysis suggests the possibility of a double-dividend occuring from taxing products *with* a CSR content. The green dividend is then the higher public good that could be achieved through both the CSR investments and the public investment that the tax allows, and, by remote analogy to the double-dividend theory, the additional redistributional benefit that taxing the CSR product enables can be interpreted as the blue dividend. In some cases, taxing CSR products can serve as a means of redistribution: it narrows the pool of green consumers purchasing the good. If we assume altruistic mtovies to be correlated with income, the tax payers will then be the consumers at the higher end of the distribution of income who pay larger taxes to make the public good available for all. We extend the analysis to study the effect of different objectives of the regulator on the choice of the tax rate. The paper is organized as follows. Section 2 introduces the basic model. The implications of a consumption tax imposed on the impure public good as well as the welfare maximizing tax are examined in Section 3. Section 4 presents the discussion of the model, which is extended to include alternative objectives of governments. Finally, Section 6 concludes.

2 Benchmark Model: the Unregulated Monopoly

In this section, we set up the benchmark model where the consumers care about the public good and the monopolist engages in CSR activities, we describe the mechanisms underlying the optimal choice of the producer and we conduct a simple comparative statics exercise to show how the equilibrium is affected by changes in the different parameters of the model.

2.1 Demand of the Heterogenous Consumers

We consider a market for a private good that consists of a a continuum of consumers and a monopolist that engages in CSR activities. CSR here is modelled as the private provision of a public good - environmentally friendly or socially responsible activities -

such that the amount of public good provided is linked to consumer purchases of the private good.

Consumers' preferences On the demand side, there is a unit mass of consumers, each having a unit demand $q \in \{0, 1\}$. They have identical preferences regarding the physical characteristics of the good. They are, however, heterogeneous regarding their valuation of the CSR activities that are undertaken by the firm that produces the good and $\theta \in [0, 1]$ is introduced to account for this heterogeneity: the more socially conscious a consumer is, the higher is his θ. We further assume that the realization of θ is private information of each consumer, it follows a cumulative distribution $F(\theta)$ and density $f(\theta)$ that are common knowledge. The utility function of a θ-type consumer is given by:

$$U(\theta, q) = \begin{cases} \beta s - \frac{1}{2}(1-\theta)s^2 + r(s,p) + \alpha - p + Y & \text{if } q = 1 \\ Y & \text{if } q = 0 \end{cases} \tag{1}$$

where $s \geq 0$ is the CSR effort that the monopolist undertakes for each unit of the private good sold; so, for the consumer, it represents the monetary contribution to social causes or to the public good provision from buying the good. Consumers derive a baseline *warm glow* utility[1] of βs with utility functions that are concave in s, with the rate of decrease being dependent on consumer's social consciousness: the higher θ, the lower the decrease in warm-glow due to a larger s. For a given level of CSR s, a consumer's utility from contributing to the public good ranges from $\beta s - \frac{1}{2}s^2$, if he does not value the firm's CSR activities at all, to βs, if he is of the most caring type.

Beside the altruistic motives from purchasing the good, consumers derive a positive utility from being seen as responsible consumers that we refer to as the *prestige or distinction utility*, r. This can be interpreted as consumers caring about the opinion others have of them or simply their self-image. Following Bénabou and Tirole (2010), we assume that this reputational gain from belonging to the group of responsible consumers emerges endogenously as it will be determined by the characteristics of this particular group at equilibrium. Furthermore, in the terms of Besley and Ghatak (2007), all consumers are assumed to be *caring*, in the sense that they all care about the overall level of public good available in the economy Y. This particular utility however is independent of their purchase decisions since the weight attributed to each is too small to affect the outcome. Finally, the parameter α represents the marginal utility from the private good consumption[2] and p the unit price set by the monopolist for the private-public good bundle he offers.

For the sake of simplicity, we assume that θ is uniformly distributed. A θ-type consumer decides to buy the good if

$$\theta \geq \frac{p - \alpha - \beta s + \frac{s^2}{2} - r}{\frac{s^2}{2}} \equiv \theta^*(s, p)$$

[1] A term that is extensively used in the litterature on the private provision of public goods and that refers to the *joy of giving*.

[2] The parameters α and β are assumed to be strictly positive.

Hence, there exists a threshold type θ^* above which consumers decide to purchase the good and below which they abstain. The prestige utility can now be formally defined: it is the expected value of the social consciousness of the group of responsible consumers compared to that of the most caring type:

$$r(s,p) = E(\theta|q=1) - \theta^{max} = E(\theta|\theta \geq \theta^*) - 1$$

with $E(\theta|\theta \geq \theta^*) = \frac{\int_{\theta^*(s,p)}^{1} \theta f(\theta) d\theta}{1-F(\theta^*)}$ being the conditional mean in the upper tail of the distribution of θ. This utility takes into account both the value of θ^* and the weight attributed to $\theta \geq \theta^*$, i.e. to which degree is the product in question is a niche product. In the uniform case, the prestige utility is then given by $r(s,p) = \frac{(\theta^*(s,p)+1)}{2} - 1$, which amounts to:

$$r(s,p) = \frac{1}{2}[1 - \theta^*(s,p)]$$

The prestige gain from being a *responsible consumer* thus increases as the pool of these consumers narrows, i.e. the more it becomes a *niche* good that only the highest types purchase. Plugging this term into the consumer's incentive constraint, the threshold type θ^* can now be written as:

$$\theta^*(s,p) = \frac{2(p - \alpha - \beta s) + s^2 + 1}{s^2 + 1} \tag{2}$$

The individual demand of a θ-type consumer now reduces to:

$$q(\theta, s, p) = \begin{cases} 1 & \text{if } \theta \geq \theta^*(s,p) \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

which can be integrated over the interval $[0,1]$ to obtain the aggregate demand:

$$Q(s,p) = \int_0^1 q(\theta) f(\theta) d\theta = \int_{\theta^*(s,p)}^1 f(\theta) d\theta = 1 - \theta^*(s,p) = \frac{2(\beta s - p + \alpha)}{s^2 + 1} \tag{4}$$

which always decreases in the price set by the monopolist but may increase or decrease with the per unit contributions to social causes, depending on the CSR-price bundle offered on the market.

2.2 Choice of the CSR-price bundle

We assume the monopolist has a constant returns to scale production technology for the private good, he has a constant marginal cost of production given by $0 \leq c < \alpha$. Contribution to the public good amounts to an increase the marginal cost by s. The monopolist decides simultaneously on the per unit monetary contributions donated to social causes, s, and the price to be charged, p, so as to maximize his payoffs given by

$$\pi(s,p) = (p - s - c) Q(s,p)$$

Proposition 1. *The monopolist has incentives to engage in CSR only if* $\beta > 1$ *and* $\alpha > c$*, the CSR-price bundle he offers on the market is then*

$$[s = \frac{\beta - 1}{\alpha - c}, p = \frac{\beta + 1}{2}s + \frac{\alpha + c}{2}]$$

Otherwise, the monopolist is better off offering $(s = 0, p_m^0 = \frac{\alpha+c}{2})$*. (proof in the appendix)*

By engaging in corporate social responsibility, the monopolist makes his product more valuable to consumers. However, he also incurs a cost by doing CSR, the total monetary contributions donated to social causes. A necessary condition for the producer to engage in CSR is that consumers' average marginal willingness to pay for a firm's social behaviour, β, must be higher than the marginal cost of increasing CSR to the firm, which is 1 dollar. Thus, only when consumers place a sufficiently high value on CSR will the firm practice it. Since offering a positive contribution to the public good alongside the private one requires raising the price, the firm cannot engage in CSR unless the willingness to pay for the private good itself covers marginal cost of production c, otherwise no one would be willing to buy the good.

Choice of the CSR content The above proposition shows that the optimal choice of social contributions is equal to the marginal profitability of CSR activities relative to that of the private good. Hence, any factor that decreases the profit from selling the private good induces the monopolist to invest more in CSR, and this is what we call the *make-up effect*, as if the producer had two businesses: selling the private good and investing in the public good, and he is trying to make up the lower profitability of the first by a higher investment in the second. For instance, CSR effort increases the lower the willingness to pay for the private good α and the larger the marginal cost of its production c. That is, a producer may choose a high CSR content of the good just because he is inefficient in the production (as captured by a high c) or the private good he sells is not strongly demanded on the market. The intuition behind this result is that the higher the cost of production, the more it pays for the firm to use CSR to expand the demand of its product and/or be able to charge a higher price for the CSR-private good bundle. This result relies on the assumption that both the public and private components of the good are substitutes in consumption.

Pricing Strategy To see the full picture, we need to take a closer look at the pricing strategy of the impure public good in this setup. From the first-order condition of the monopolist's maximization problem with respect to the price, it can be seen that the optimal price depends on the CSR content of the product such that:

$$p^*(s) = p_s s + p_m^0 = \frac{\beta + 1}{2}s + \frac{\alpha + c}{2} \tag{5}$$

where $p_s s$ denotes the weight of CSR in the price the monopolist charges, so p_s can be seen as the unit price of the contributions to social causes and p_m^0 is the part of the price

imputed to the private good, that is the monopoly price absent any CSR efforts. The optimal price thus consists of the per unit investment in the public good weighted by the premium he is able to charge for his CSR activities, and the average of the marginal utility and cost of the private good provision. Since β must be greater than 1 for the monopolist to engage in CSR, it is always the case that the premium on CSR exceeds 1.

Lemma 2. *In a monopoly setup, each dollar contributed to social causes via the purchase of the impure public good costs the consumer more than one dollar.*

Hence, unless the monopolist has a comparative advantage in providing this particular public good, this is perhaps not the most efficient means for the private provision of public goods.

2.3 Equilibrium Analysis

This part of the analysis addresses two main questions: *How do the values of the different parameters affect the choice of the CSR-price bundle? And is CSR always welfare-improving?*

Comparative Statics A simple comparative statics exercise allows us to discuss the impact of the different parameters on the optimal choice of the CSR-price bundle. For this part, we refer to the optimal value of CSR content given in proposition 1 and the pricing strategy given by equation (5). While a higher marginal cost c always increases the price, by increasing both the per unit contributions via the make-up effect and the price of the private component of the good[3], a higher willingness to pay for the private good α has an ambiguous effect on the price: on the one hand, it makes the monopolist more free-handed in charging a higher price for the private component, but on the other, reduces his incentives for offering CSR alongside his good, that is per unit contributions fall. Counterintuitively, if the latter effect is stronger, it may actually be optimal for the monopolist to charge a lower price even though the willingness to pay for his product has increased[4].

In line with previous works on CSR, we find that CSR always increases with the average interest towards CSR as represented by the willingness to pay for the public good, β. Perhaps one possible explanation for this is that the increase in consumers' demand for firms to behave responsibly leads to more pressure exerted on firms by consumers, activists and NGOs and this, in turn, induces the firm to embrace CSR activities, and this is the *private politics* argument for CSR (Baron, 2003). But we also find that the premium for CSR increases with this interest in CSR. As β increases, not only does the level of CSR undertaken by the firm increase, but also the weight of CSR in the price set by the monopolist increases. So the more consumers in the economy

[3]Given a general form distribution $F(\theta)$, a more efficient monopolist may then yield a higher or a lower surplus to consumers.

[4]This is the case where the private good is sufficiently more profitable than CSR, precisely, when $(\alpha - c)^2 > \beta^2 - 1$.

care about the public good, the higher the price they will be charged, not only because the per unit contributions to the public good increase but also because the producer now puts more weight on those increased contributions when determining his optimal price. Thus the impact of such increase on consumer surplus is a priori ambiguous. The following discussion gives conditions under which a higher demand for firms to behave responsibly *is* welfare improving for the consumers.

Market Outcomes Plugging the optimal price and CSR content into the demand and profits functions yields the equilibrium values $Q(s^*, p^*) = \alpha - c$ and $\pi(s^*, p^*) = \frac{(\alpha+c)^2}{2} + \frac{(\beta-1)^2}{2}$. Consumers with $\theta \geq 1-(\alpha-c)$ purchase the good and those below this threshold abstain. Now we would like to assess the welfare impact of CSR. For this, we compare between the results obtained and the case where the monopolist does not engage in CSR ($s = 0$). In the latter, the market outcomes coincide to the standard monopoly, where the producer maximizes profits $\pi = (p - c)Q(p)$. The equilibrium output, price and profits are, respectively, $p_m^0 = \frac{\alpha+c}{2}$, $Q^0 = \alpha - c$ and $\pi^0 = \frac{(\alpha-c)^2}{2}$.

Lemma 3.
- *In the equilibrium of the benchmark case with CSR: (i)* $Q(s^*, p^*) = Q^0$, *(ii)* $p^*(s^*) > p^0$, *(iii)* $\pi(s^*, p^*) > \pi^0$, *and (iv)* $CS(s^*, p^*) \lesseqgtr CS^0$.
- *CSR is welfare improving iff* $\beta > \frac{\sqrt{2}\sqrt{3(\alpha-c)+2}+1}{3}$ *(proof in the appendix)*

This result shows that aggregate output will be the same whether the monopolist exerts CSR efforts or not, whereas the prices and profits will be higher in the case where he does CSR. In our model, consumers perceive that the product of the firm that engages in CSR is of a high "quality". The monopolist knows about this and uses CSR to expand consumer demand. But on the other hand, CSR means that he will have higher monetary costs. Thus only when consumers have sufficiently strong preferences for CSR - $\beta > 1$ - will the monopolist have an incentive to engage in CSR so that he can be compensated for the increased cost he incurs. These higher prices weigh negatively on the demand and thus the total demand remains unchanged at equilibrium. The above lemma also shows that the firm's profits increase with CSR since the aggregate output remains the same and the higher equilibrium prices more than compensate the cost of CSR (recall that $p_s > 1$). So the profits in the case of CSR are simply two additive terms $\pi^0 + \frac{(\beta-1)^2}{2}$.

Finally, introducing CSR on the market is welfare-improving for the consumers only if the average interest in CSR is sufficiently large relative to the marginal utility from the private good. Two explanations are behind this finding. First, in our setup, introducing a positive amount of CSR alongside each unit produced increases the price and excludes consumers with lower interest in CSR (i.e. lower θ). Thus the loss in both warm glow and prestige utility of the excluded group is only offset by the gain of the buyers if the latter put a large value on such activities. Second, we assume the government does not intervene on the market up to this point and hence the public good is solely provided through CSR activities of the firm such that $Y = sQ = \beta - 1$. Total amount of public good available thus increases in the average social interest in CSR, β. CSR is then

welfare-improving for the consumers if $\frac{(\beta-1)^2}{4}+(\beta-1)>\frac{\alpha-c}{2}$ (proof in the appendix). Otherwise, consumers are better off consuming the private good with no CSR content. In sum, CSR is welfare improving if consumers have *sufficiently* strong preferences for such activities, that is $\beta>\frac{\sqrt{2}\sqrt{3(\alpha-c)+2}+1}{3}$ because only then will the gains of both the monopolist and the consumers outweigh the loss of warm glow and prestige utility of the excluded buyers.

3 Regulated Scenario

To assess the impact of taxing CSR products, a game where the government first sets the tax rate then the monopolist decides on his CSR-price bundle is considered. The impact of the tax on the level of CSR efforts as well as the pool of consumers paying this tax are analyzed.

3.1 Choice of the CSR-price bundle: Second-stage outcome

We introduce into the model a regulator that imposes an ad valorem tax, denoted by t, and uses the collected taxes to provide a certain amount of the public good, which can complement or substitute for the public good provided by the monopolist as we shall see. The timing of the game goes as follows. In the first stage, the government sets the tax rate t that maximizes its objective function. In the second stage, given the tax rate, the producer decides whether or not he will engage in CSR activities and chooses s and p simultaneously as to maximize his profits. Finally, each consumer, given his θ, forms his demand taking into account the tax rate set by the government and the price and per unit contributions set by the producer. The game will be solved backwards. The point of departure is thus the subgame played by firms and consumers in the final stage after the government has decided on the tax rate to be imposed. The θ-type consumer chooses the quantity $q(\theta)$ that maximizes his utility given by

$$U(\theta)=\begin{cases}\beta s-\frac{1}{2}(1-\theta)s^2+r(s,p)+\alpha-(t+1)p+Y & \text{if } q=1\\ Y & \text{if } q=0\end{cases} \tag{6}$$

Using the same expression for the reputational gain, the individual demand of a θ-type consumer will be given by

$$q(\theta,s,p)=\begin{cases}1 & \text{if } \theta\geq\theta^*(s,p)\\ 0 & \text{otherwise}\end{cases}$$

where $\theta^*(s,p)=\frac{2[(t+1)p-\alpha-\beta s]+s^2+1}{s^2+1}$. By integration of the individual demands over the interval $[0,1]$, we obtain the aggregate demand:

$$Q(s,p,t)=\frac{2[\beta s-(t+1)p+\alpha]}{s^2+1} \tag{7}$$

The monopolist then maximizes his profits now given by

$$\pi\left(s,p,t\right)=\left(p-s-c\right)\,\mathrm{Q}\left(s,p,t\right)$$

Proposition 4. *The optimal choice of the firm in the regulated scenario for the level of CSR per unit sold and for the overall price to be charged is:*

- *if* $\beta > t+1$ *and* $\alpha > c(t+1)$,

$$s^*(t)=\frac{\beta-(t+1)}{\alpha-(t+1)c} \tag{8}$$

and

$$p^*(t)=\frac{\beta^2-(t+1)^2+\alpha^2-(t+1)^2c^2}{2(t+1)[\alpha-c(t+1)]} \tag{9}$$

- *Otherwise, the monopolist is better off offering* $s=0$ *and* $p=\frac{\alpha+c(t+1)}{2(t+1)}$.

This proposition states that the firm will engage in CSR only if $\beta > t+1$ and $\alpha > c(t+1)$[5]; that is CSR is feasible only if the average marginal willingness to pay for CSR activities covers the *augmented* marginal cost of CSR and the marginal willingness to pay for the private good exceeds the taxed marginal cost of production. If the above conditions hold, the increase in firm's profits due to the higher price it can set for its CSR-private good bundle overcomes the increase in firm's costs due to CSR effort and taxes- compared to the regulated case without CSR activities, and therefore, the firm has an incentive to provide a positive level of CSR when complying to the tax rate set by the government. Otherwise, the firm will have no incentive to engage in CSR, it will pay the taxes imposed by the regulator and produce only the private good (if $\alpha > c(t+1)$). Equilibrium aggregate demand, CSR investments and profits will then be

$$Q^*(t)=\alpha-c(t+1)$$

$$S^*(t)=s(t)Q(t)=\beta-(t+1)$$

$$\pi^*(t)=\frac{[\beta-(t+1)]^2+[\alpha-c(t+1)]^2}{2(t+1)} \tag{10}$$

Before we plug the results obtained into stage 1 of the game where the government decides on the tax rate to impose, we analyze the mechanisms underlying both firm's and consumers' choices.

3.2 How do Consumers and the Monopolist react to an Ad Valorem Tax?

For this part of the analysis, we consider t to be exogenous and conduct a simple comparative statics exercise to assess its impact on the different choice variables of both the monopolist and the consumers. Two main questions are being discussed: *Can more taxes imply more CSR?* and *Who actually pays the tax?* Propositions 4.3 and 4.4 bring answers to these questions.

[5]We refer the reader to the proof of proposition 1 given in the appendix to verify that $s^*(t)$ and $p^*(t)$ given in the above proposition yield a maximum under these conditions.

Tax rate and CSR component of the good One of the main findings of this paper is that a higher tax does not necessarily have a repressive effect on the CSR content of the product. The following proposition presents the conditions under which this result is valid.

Proposition 5. *Per unit contributions increase in the tax rate if* $\frac{\beta}{1} > \frac{\alpha}{c}$*, and decrease otherwise.*

This result is obtained by differentiating the optimal choice of CSR with respect to the tax rate which yields

$$\frac{ds(t)}{dt} = \frac{\beta c - \alpha}{[\alpha - c(t+1)]^2} \tag{11}$$

The consumption tax is imposed on the good the firm sells, and is perceived by the consumers as a price increase. So in a way, it increases the unit cost incurred by the firm since its price is now taxed. Furthermore, since the unit price consists of two parts, namely the marginal cost of the social contributions (1 dollar) and the marginal cost of the private good (c), it is as if those two components have been taxed. *A priori* one would expect the increase in the tax rate to decrease the CSR effort of the producer who now incurs higher costs for both types of goods he sells. We find however that this is not necessarily the case.

It is possible that an increase in the tax rate set by the regulator increases the monopolist's incentives to raise the CSR component of his product, this is the case when the marginal utility to marginal cost ratio is higher for the CSR activities than for the private good; that is, if $\frac{\beta}{1} > \frac{\alpha}{c}$. As can be seen from (8), when the regulator increases the level of the consumption tax by Δt , he reduces the marginal profitabilities of both goods -CSR activities and the private good- but not necessarily proportionally. While the average marginal profitability of CSR ($\beta - (t+1)$) decreases by Δt, that of the private good ($\alpha - c(t+1)$) decreases by $c\Delta t$. So the tax will affect not only the absolute profitabilities, but also the relative ones, and hence it will affect the optimal level of CSR. Only if the CSR effort is *sufficiently* profitable will the increase in tax induce the producer to increase his level of CSR to compensate for his lower returns from selling the private good. This can be seen as the monopolist operating on two separate markets, and taxes make him redistribute his businesses according to the relative profitability of each. It should be noted however that total CSR efforts always decrease in the tax rate ($\frac{dS(t)}{dt} = -1$).

Effect of t on the price of the public-private bundle Let us consider the price determination mechanism, which gives the following relation between the optimal price and CSR level undertaken by the firm, given the tax rate:

$$\begin{aligned} p^*(s,t) =& \frac{\beta + (t+1)}{2(t+1)} s(t) + \frac{\alpha + c(t+1)}{2(t+1)} \\ =& p_s(t)s(t) + p_m^0(t) \end{aligned} \tag{12}$$

with $p_s(t)$ being the premium charged for CSR and $p_m^0(t)$ the part of the price imputed to the private good that would have been charged by the monopolist in the absence of CSR. Using this decomposition of the overall price, we analyze the effect of an increase in the tax rate on both the *quantity* and the *price* of the CSR component of the good, and consequently on the price of the private-public bundle on the market. Since CSR effort - as a component of the price- is taxed, an increase in the tax rate should restrict the monopolist's ability to charge a high price for the CSR component of his product, $\frac{dp_s(t)}{dt}$ is always negative. Clearly, if a tax increase induces the monopolist to reduce his CSR activities, the part of the price imputed to CSR will decrease. And since the price of the private component also always decreases in the tax rate, $\frac{dp_m^0(t)}{dt} < 0$, increased taxes would lead to a lower price for the impure public good on the market. In the case where the tax increase leads to a higher CSR content of the product, the overall price may increase or decrease.

Finally observe the relation between $\frac{dp(t)}{dt}$ and $\frac{ds(t)}{dt}$. A simple differentiation of eq.(12) shows that they can never be both null at the same time; meaning that, after a tax increase, the producer cannot keep both his level of per unit contributions *and* the price he charges unchanged. Note also that $\frac{ds(t)}{dt}$ is always greater than $\frac{dp(t)}{dt}$ if they are both positive, that is, the producer can never increase his price by more than he increases his CSR effort. However if they are both negative, then $\frac{dp(t)}{dt}$ is necessarily greater than $\frac{ds(t)}{dt}$ in absolute terms; meaning that if the producer reduces his CSR effort, he has to decrease the price by an even larger amount. This relation between $\frac{dp(t)}{dt}$ and $\frac{ds(t)}{dt}$ suggests the possibility that a tax increase may widen the pool of consumers purchasing the good. If it induces the producer to increase his per unit contributions - and the price weakly increases or even decreases - consumers with lower θ would find the product more appealing as the warm glow utility from the purchase of the good increases. In the case where $s'(t) < 0$, the price reduction that accompanies the fall in the CSR content - and that is stronger in magnitude - makes the good more affordable for consumers with lower θ. This point will be the focus of the following discussion.

Who actually pays the tax? Until now, we left unspecified the behaviour of the different *types* of consumers in the economy, having summarized it by the aggregate demand function. To see the whole picture, we need to be more specific on the impact of the tax on *who* buys the good and thus who actually contributes the most to the public good provision. This question is particularly important if we think of θ as being correlated to income.

We find that, *regardless of the impact of the tax rate on the monopolist's choice of the CSR content and the price*, the pool of green consumers always narrows, at equilibrium, as the tax increases. This result is due to the *prestige* component in the utility function of consumers $\frac{1-\theta^*}{2}$: even if after a tax increase consumers with lower θ find the product more appealing (higher CSR content) or more affordable (lower price), they will be repelled from the lower prestige utility that results from everyone buying the good. Hence, by the means of the tax rate, the regulator can actually determine the pool of

green consumers since, at equilibrium,

$$\theta^*(t) = 1 - [\alpha - c(t+1)] \tag{13}$$

This also explains why the aggregate demand always decreases in the tax rate, as can be seen from (10), regardless of the monopolist's choices of s and p.

3.3 Choice of the Tax rate: A Benevolent Government

Now we turn to stage one of the taxation game where the regulator decides on the tax rate to be imposed given the behaviour of the different agents in the economy. This choice depends, on the one hand, on the production technology of the public good, and, on the other hand, on the political and social objectives of the regulator.

We begin by describing the government's objective in its simplest form, deferring discussions on the political and social objectives of the regulator until later. There is a single *welfare-maximizing* regulator, raising revenue only through taxes on products. The regulator adopts an ad valorem tax method, taxes will be imposed on the amount of sales. If the regulator sets a tax rate t, the tax revenue will be

$$G(t) = tp(t)Q(t) = \frac{t[\beta^2 - (t+1)^2 + \alpha^2 - c^2(t+1)^2]}{2(t+1)} \tag{14}$$

We assume that tax revenues are meant for public good provision in order to benefit consumers. Unlike the unregulated scenario where the overall level of public good in the economy, Y, coincides with the total monopolist contributions to social causes, after the government intervention, $Y(t) = Y(G(t), S(t))$ is a certain function of private provision - the total CSR efforts of the monopolist - and the public provision of the public good which coincides with the total tax revenues. Now a brief discussion on the functional form of $Y(t)$ and consequently on its impact on the government's choice is necessary. We consider two scenarios : in the first, the private investment in the public good and the government provision of the public good are substitutes, and in the second, they are complements.

Production Technology of the Public Good A simple additive production function helps illustrate the case where the private and public investment in the public good are substitutes:

$$Y^{subs}(t) = G(t) + S(t)$$

Under this functional form, an increase in G by 1 dollar adds to the overall level of the public good the same amount that a dollar increase in S does. For instance, suppose that the public good provision consists in building public schools in a poor neighborhood. The additive production function assumed here means that a dollar that comes from firm's contributions to the public good through CSR will help finance the project the same way that a dollar that comes from the government would.

Second, we consider the *complementarity* scenario. To illustrate this case, a simple production function is considered:

$$Y^{comp}(t) = G(t)S(t)$$

Given this functional form, the government complements the provision of the public good by the firm. For instance, this could be the case of a firm providing access to drinking water and proper sanitation to students of a public school in a poor neighbourhood.

We consider a *benevolent Government* that aims at maximizing the social welfare given by the sum of the consumers' surplus - which includes the overall level of public good - and the firm's profits:

$$\max_t W^i(t) = CS_i(t) + \pi(t) = \frac{[\beta - (t+1)]^2}{4} + Y_i(t) + \pi(t) \tag{15}$$

where $i = \{subs, comp\}$ denotes the production technology of the public. It should be noted that producer's profits always fall in the tax rate for two reasons: the negative *net price effect* and the *demand reducing* effect. The former only considers the benefits and costs the monopolist incurs per unit sold due to a tax increase, regardless of the impact of such increase on the total quantity sold. On the one hand, the increase in the tax affects the level of CSR effort per unit sold chosen by the producer and this in turn will affect the price he charges. This net price effect $(\frac{dp(t)}{dt} - \frac{ds(t)}{dt})$ is found to be *always* negative, that is, the unit price the monopolist obtains net of the CSR cost always decreases in the tax rate. Adding to this effect that the aggregate demand always decreases in the tax rate, profits always fall after a tax increase.

Furthermore, the tax reduces the responsible consumers' warm glow utility from purchasing the good, even if it induces the monopolist to increase the CSR content of his product. This is mainly due to the exclusion of some consumers who no longer purchase the good. The firm sets the optimal price as to extract all consumers' surplus from the private good since consumers are not heterogenous in this dimension, but leaves some warm glow and prestige surplus to the responsible consumers. What ultimately determines the optimal tax rate to be imposed by the regulator is the resulting overall level of public good Y - given that it also reduces the firm's total CSR investments. Solving for the optimal tax rate yields the following result:

Proposition 6. *A welfare-maximizing regulator optimally sets:*

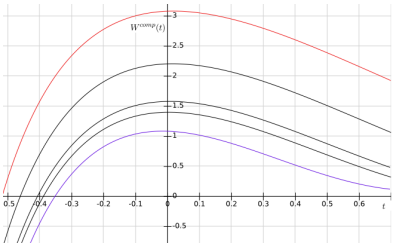
- *In the substitution case: A negative tax rate (subsidy) given by:*

$$t_W^{subs} = -\frac{\beta + 1}{2c^2 + 1}$$

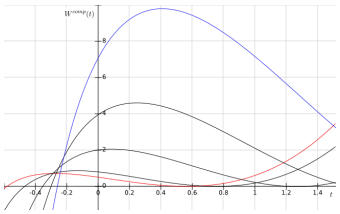
- *In the Complementarity case: under the sufficient - but not necessary - condition*

$$c^2 < \frac{(3\beta - 4)(\alpha^2 + \beta^2)}{2} - 1$$

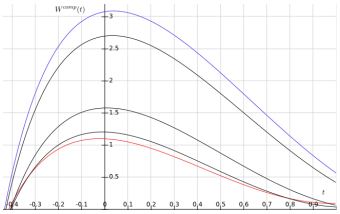
the regulator optimally sets a positive tax rate $t_W^{comp} > 0$. (proof in the appendix)



(a) Varying c (with $\alpha = 2$ and $\beta = 2.2$). The red curve corresponds to the case where $c = 0$, which yields $t_W^{comp} = 0.01841$, and the blue one to $c = 1.9$, with $t_W^{comp} = -0.01554$



(b) Varying β (with $\alpha = 2$ and $c = 1.5$). The red curve corresponds to the case where $\beta = 1.5$, which yields $t_W^{comp} = -0.2736$ and the blue one to $\beta = 4$, with $t_W^{comp} = 0.4087$



(c) Varying α (with $\beta = 2.2$ and $c = 1$). The red curve corresponds to the case where $\alpha = 1.2$ which yields $t_W^{comp} = -0.0222$ and the blue one to $\alpha = 5$, with $t_W^{comp} = 0.0679$

Figure 1: Comparative Statics on the value of t_W^{comp}

In the substitution scenario, both consumers' surplus and the monopolist's profits always decrease in the (positive) tax rate: it both narrows the pool of consumers and weighs negatively on the price; so the monopolist has disincentives to contribute to the public good. Furthermore, the amount of purchases that are being taxed decreases which weighs negatively on the tax revenues and hence the government provision of the public good, G, which is then insufficient to compensate for the monopolist's profits and the loss in consumers' suprlus either. This suggests that a good public policy would be to subsidize the firm's product rather than tax it.

In contrast, when both forms of investments in the public good are complements, a benevolent regulator could optimally intervene on the market by setting a tax rate that allows it to finance a certain level of public investment, G, that is necessary for the firm's CSR investments to be beneficial for the consumers, that is, for the resulting public good, Y, to be sufficiently large to offset the losses of both the monopolist and the responsible consumers (from the warm glow utility).

Most interesting is the comparative statics on the values of t_W^{subs} and t_W^{comp}. We find that *more efficient producers receive higher subsidies if their CSR investments substitute for the government provision but higher taxes if they complement it.* Efficient producers are then better off substituting for the benevolent government through their CSR activities.

In the substitution case, a welfare maximizing regulator sets a higher subsidy the more consumers care about CSR activities of the firm (larger β) and the lower his marginal cost in the private good production c. Intuitively, a larger social demand for CSR activities as representes by a larger β amounts to larger CSR investments at equilibrium which would give the regulator higher incentives to subsidize. However, a larger marginal cost gives the monopolist an opportunity to use the subsidy to compensate for his lack of profitability on the private good market rather than increase the CSR content of his product. A subsidy, as opposed to a positive tax, induces the monopolist to increase the CSR content of his product only if he is sufficiently efficient, because only then it would not be directed to subsidize his private activities.

In contrast, in the complementarity case, as illustrated in Figure 1, the socially optimal tax rate is also larger (smaller subsidy) the more CSR activities are demanded but the more efficient the producer is[6]. This result holds whether a higher tax induces the monopolist to increase or reduce the CSR content of his product ($\frac{\beta}{1} \lesseqgtr \frac{\alpha}{c}$). The tax rate[7] thus increases in any factor that increases the producer's profit margin (higher β and/or α, lower c) because then the regulator can extract tax revenues to finance the public investment without hampering CSR activities and without causing a sharp decrease in both the monopolist's profits and the responsible consumers' surplus.

Recall that both marginal willingness to pay for the private and for the public components of the good have a positive effect on the price and hence on the monoplist's profits. Further, as the price increases, the proceeds from taxation increase and can be reinjected in the form of government provision of the public good which complements the CSR investments in this case and benefits both the responsible and irresponsible consumers. In contrast, as the marginal cost of the private good increases, the price of the private good increases but the monopolist reduces the CSR content, which has a negative effect on both the price and the responsible consumers' welfare. The tax revenues fall as well thus explaining the decrease in the social welfare. Nonetheless a higher tax needs to be imposed for the regulator to be able to extract a decent amount of tax revenues to finance the government provision of the public good, necessary to make the CSR investments useful.

This analysis suggests that, an economy where consumers have, on average, a high demand for firms to engage in CSR and value the private good to which CSR investments are linked, would benefit from government intervention through taxation. In that particular case, taxing CSR products *is* welfare improving and can serve as a *means of progressive taxation* or yields a *double dividend* as will be discussed further below, provided that the proceeds from taxation are used to enhance the productivity of such investments. Taxing those products becomes even more beneficial, in terms of a higher welfare, the more efficient the producers are in the production of the private good because then the crowding-out of private investment by the government provision will be minimized.

4 Alternative Objectives for the Regulator

So far we assumed that the regulator maximizes the social welfare. In this section, we extend the base model by assuming two alternative objectives for the regulator:

[6]The values used in Figure 1A are $\alpha = 2$, $\beta = 2.2$, and $c \in \{0, 0.5, 1, 1.2, 1.9\}$ which yield optimal tax rates t_{W_2} of 0.01841, 0.01570, 0.0081, 0.0038 and -0.01554 respectively. In Figure 1B, they are $\alpha = 2$, $c = 1.2$, and $\beta \in \{1.5, 1.8, 2.5, 3.2, 4\}$. In figure 1C, they are $\beta = 2.2$, $c = 1$, and $\alpha \in \{1.2, 1.5, 2, 3, 5\}$

[7]It can be easily verified in Figure 1 that, for the curves that are maximized with a negative tax rate, the parameters do not satisfy the condition given in Proposition 6. It should also be noted that as we vary the values of β, α and c, we vary the interval over which t satisfies the conditions $\beta > (t + 1)$ and $\alpha > c(t + 1)$, it can also be verified that the ascending part of the welfare curves (in Figure 1) after achieving the maximum only occurs for values of t that do not satisfy the conditions and hence do not alter the results.

maximization of overall level of public good and of tax revenues.

4.1 Maximizing Tax revenues

As the first alternative objective, consider a revenue-maximizing regulator. This is a reasonable assumption under most circumstances and can be justified by assuming a Leviathan-type government. Alternatively, revenue maximization objectives of the governments can be justified when governments face severe revenue shortfalls; therefore, to them, their tax revenue becomes more important than private good consumption, warm glow utility and firm's profits. There is a single revenue-maximizing regulator, raising revenue only through taxes on products. His objective is then

$$\max_t G(t)$$

given by (14). The first-order condition of this maximization problem is given by[8]:

$$(2t^3 + 5t^2 + 4t + 1) = \frac{\alpha^2 + \beta^2}{1 + c^2} \tag{16}$$

From the implicit differentiation of (16), we find that *under a Leviathan-type government, inefficient producers are imposed lower taxes.* There are two points to consider when the objective is the tax revenues maximization: the per unit tax proceeds, $t \times p(t)$, and the tax base, $Q(t)$. The per unit tax proceeds clearly increases in all factors that make the monopolist more free-handed in increasing the price he sets for his product on which the tax is imposed. A higher marginal cost is one of these factors: a larger c increases the price by increasing the price he charges for the private component of the good, but also increases the CSR content of the product - through the *make-up effect* discussed in section 3 - and hence increases the part of the price attributed to CSR. This higher price however reduces the demand and hence the tax base (recall that $\frac{dQ(t)}{dt} = -c$). Hence the revenue-maximizing regulator sets his tax t_{TR} at a value before the latter effect dominates and drags down the total tax revenues. This maximal value being smaller the larger the marginal cost c (as the reduction in demand is then stronger for lower values of t), a lower tax rate is imposed on inefficient producers.
On the other hand, both marginal willingness to pay for the private good and for CSR have a positive effect on t_{TR} as they both increase the price, and hence the per unit tax proceeds, without reducing the tax base.

[8] which yields a maximum whenever $t \geq 0$ - which is always true for the maximization of tax revenues - since the second derivative:

$$-\frac{(1 + c^2)(t^3 + 3t^2 + 3t + 1) + (\alpha^2 + \beta^2)}{(t + 1)^3} < 0$$

is then negative

4.2 Maximizing Overall Level of Public Good

As the second alternative objective, assume a regulator who aims at maximizing the available level of public good, taking into account the nature of interdependence between the CSR investments and the public good provided through the government, that is

$$\max_t Y_i(t)$$

The Substitution Scenario The tax rate, denoted t_Y^{subs}, maximizes $Y^{subs}(t) = G(t)+S(t)$ and thus solves the first-order condition[9]:

$$(2t^3 + 5t^2 + 4t + 1)(c^2 + 1) + 2(t + 1)^2 = \alpha^2 + \beta^2 \tag{17}$$

A necessary condition for a subsidy (negative t_Y^{subs})[10] is that $t < -\frac{1}{1+c^2} - \frac{1}{2}$. From the first-order condition, it can be seen that it is more likely that $t_Y^{subs} < 0$ the smaller the gap between $(\alpha^2 + \beta^2)$ and $(1 + c^2)$- because only then can the positive effect that a subsidy may have on the monopolist's private investment in CSR offset its negative effect on the government's public investment, as will be discussed.

The comparative statics of t_Y^{subs} with respect to c, β and α respectively are illustrated in Figure 2. While a public-good maximizing regulator sets a lower tax rate (a higher subsidy) the more inefficient the producer is in the production of the private good, both a higher willingness to pay for the private good and for CSR activities induce the regulator to impose a lower subsidy (a larger tax rate), as opposed to the socially optimal case. These comparative statics[11] suggest that a public-good maximizing regulator sympathises with inefficient producers and crowds out the CSR activities of the efficient ones.

Lemma 7. *In the substitution case, from a welfare maximization perspective, inefficient producers should be given lower subsidies, however from a public-good maximization perspective, they should be given larger subsidies (or imposed smaller taxes).*

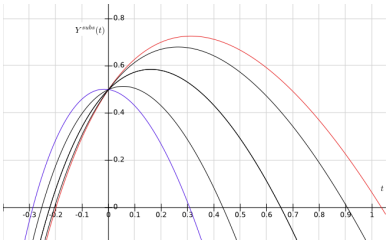
The idea behind this finding is that, to maximize welfare, the regulator takes into account the impact of the subsidy on the CSR content of the product as it affects the warm glow utility of the responsible consumers; inefficient producers are given less subsidies because the subsidy is likely to be absorbed to compensate for their lack of profitability on the private market rather than enhance the CSR content of the product.

[9] which is also a maximum for all positive values of t since the second derivative is

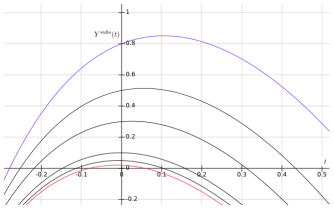
$$-\frac{(c^2 + 1)(t^3 + 3t^2 + 3t + 1) + (\alpha^2 + \beta^2)}{(t + 1)^3} < 0$$

[10] and for the LHS in (17) to remain positive.

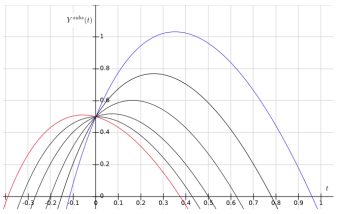
[11] The values used in Figure 2A are $\alpha = 2$, $\beta = 1.5$, and $c \in \{0, 0.5, 1, 1.5, 1.9\}$. In Figure 2B, they are $\alpha = 2$, $c = 1.5$, and $\beta \in \{1.02, 1.1, 1.3, 1.5, 1.8\}$. In Figure 2C, they are $\beta = 1.5$, $c = 1.2$, and $\alpha \in \{1.2, 1.5, 1.8, 2.2, 2.63\}$



(a) Varying c (with $\alpha = 2$ and $\beta = 1.5$). The red curve corresponds to the case where $c = 0$ and the blue one to $c = 1.9$



(b) Varying β (with $\alpha = 2$ and $c = 1.5$). The red curve corresponds to the case where $\beta = 1.02$ and the blue one to $\beta = 1.8$



(c) Varying α (with $\beta = 1.5$ and $c = 1.2$). The red curve corresponds to the case where $\alpha = 1.2$ and the blue one to $\alpha = 3$

Figure 2: Comparative Statics on the value of t_Y^{subs}

For the public good maximization purpose however, the regulator is more tolerant with inefficient producers: the profit margin of those producers being smaller, it is harder to extract tax revenues to finance a decent amount of public investment that is sufficient to offset the crowding-out effect of the tax. The regulator then has less incentives to tax. Furthermore, to increase their private investment in the public good, the regulator would have to bear the cost of their lack of profitability on the private market *and* offer them incentives to increase their CSR investment. They are then offered larger subsidies.

Once the objective is shifted towards maximizing the overall public good, the main point to consider is whether the monopolist's business is going well and hence whether there is room for government intervention. If the monopolist's business is *not* going well -either because he faces a high cost or a low demand for his product and CSR activities- the regulator is likely to offer a subsidy because then there is not much to tax and the government cannot extract enough revenues to substitute for the private provision of the public good through CSR, so having one public good provider is better than none. Only when the market's conditions are favorable for the producer (low c and/or high β and α), will the regulator consider taxing his product to generate revenues and finance the government provision.

Proposition 8. *In the substitution case, comparing the tax rate chosen by the regulator under different objectives,* $t_W^{subs} < t_Y^{subs} < t_{TR}$ *always. (proof in the appendix)*

In the substitution case, a lower tax rate is needed when the objective is to maximize the overall level of public good rather than the tax revenues. This is because the public-good maximizing tax takes into account the crowding-out effect, that is the negative effect of the tax on the total CSR efforts exerted by the monopolist while the revenue-maximizing tax does not. Further, since the tax has a negative effect on both the monopolist's profits and the responsible consumers' welfare, the tax that takes those effects into account, t_W^{subs}, is even smaller.

Consider a monopolist who directs his CSR investments towards improving the living conditions for people in a remote village by providing safe drinking water for the disadvantaged homes for instance. If the aim of the regulator is to maximize tax proceeds, he

would set a positive tax rate that leads to a reduction in the CSR investments and hence the services that would have been provided to that village are reduced. This could be the case of a government that faces a severe revenue shortfall that so forcefully led it to reduce the CSR investments of the firm to the benefit of some other public expenditures, or it could simply be the case by a Leviathan-type government.
On the other hand, if improving living conditions for disadvantaged homes is a national project, the regulator ought to either (i) tax the product of the firm engaging in CSR (if it is generating large revenues and hence there is room for government intervention) at a lower rate than in the previous scenario so as to leave the producer some incentives to engage in CSR, or (ii)to subsidize his product if he does not generate large revenues because in this case the government would not be able to generate enough tax proceeds to finance an amount of public good that compensates for the part of CSR investments it crowds out. If the product is taxed, this could be seen as a means of redistribution as discussed earlier. If it is subsidized, this means the government supports the producer to step in this particular area as taxing him would simply amount to less services being provided to the remote villages.
Finally, a welfare-maximizing regulator would always subsidize the monopolist and will not try to crowd out his investments, even if the tax proceeds could be recycled to finance the government provision and result in better access to safe drinking water, so as not to reduce neither the responsible consumers' warm-glow from contributing to helping the disadvantaged people, their prestige utility from buying the good, nor the profits that those activities enable for the monopolist.

The Complementarity Case The objective here is to maximize $Y^{comp} = G(t)S(t)$ which yeilds the first-order condition:

$$\frac{(3t^4 + 10t^3 + 12t^2 + 6t + 1) - \beta(2t^3 + 5t^2 + 4t + 1)}{(t+1)^2 - \beta} = \frac{\alpha^2 + \beta^2}{1 + c^2} \tag{18}$$

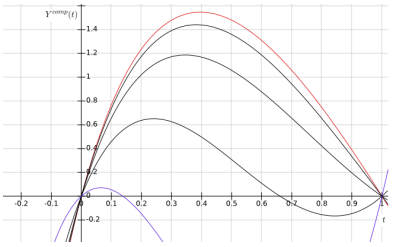
Let t_Y^{comp} denote the tax rate imposed in this case. The second-order condition is given by setting $\frac{\partial Y^{comp2}}{\partial^2 t} + (\frac{\partial Y^{comp}}{\partial t})|_{t=t^*} < 0$, which yields

$$(t+1)^2[(c^2+1)(3(2t+1)(t+1) - \beta(3t+2)) - (\alpha^2 + \beta^2)] < 0$$

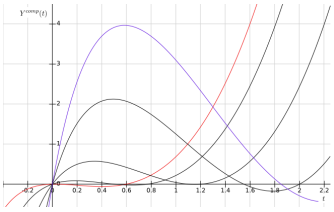
Intuitively, it makes no economic sense to have a subsidy in this case as it yields a negative overall level of public good[12]. The comparative statics are similar - not in the magnitude however - to the optimal t_W^{comp} - as shown in Figure 3[13]. A higher willingness

[12]We thus only consider the cases where either $\beta > 3$ or $c^2 < \frac{(3\beta^2 - 2\beta + 3) + 8(\alpha^2 + \beta^2)}{3(3-\beta)^2} - 1$ which are necessary conditions for t_Y^{comp} to be positive. Note that the SOC is satisified for $t_1 < t_Y^{comp} < t_2$ such that $t_1 = \frac{\beta - 3}{4} - \frac{\sqrt{3}\sqrt{(c^2+1)[(3\beta^2 - 2\beta + 3) + 8(\alpha^2 + \beta^2)]}}{12(c^2+1)}$ and $t_2 = \frac{\beta - 3}{4} + \frac{\sqrt{3}\sqrt{(c^2+1)[(3\beta^2 - 2\beta + 3) + 8(\alpha^2 + \beta^2)]}}{12(c^2+1)}$. These conditions are necessary for $t_2 > 0$

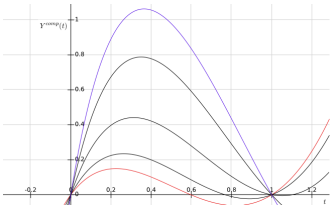
[13]The values used in Figure 3A are $\alpha = 2$, $\beta = 3$, and $c \in \{0, 0.8, 1, 1.5, 1.9\}$. In Figure 3B, they are $\alpha = 2$, $c = 1$, and $\beta \in \{1.05, 1.5, 2.2, 3, 3.5\}$. In Figure 3C, they are $\beta = 2$, $c = 1$, and $\alpha \in \{1.05, 1.5, 2.2, 3, 3.5\}$



(a) Varying c (with $\alpha = 2$ and $\beta = 3$). The red curve corresponds to the case where $c = 0$ and the blue one to $c = 1.9$



(b) Varying β (with $\alpha = 2$ and $c = 1$). The red curve corresponds to the case where $\beta = 1.05$ and the blue one to $\beta = 3.5$



(c) Varying α (with $\beta = 2$ and $c = 1$). The red curve corresponds to the case where $\alpha = 1.05$ and the blue one to $\alpha = 3.5$

Figure 3: Comparative Statics on the value of t_Y^{comp}

to pay for the private component of the good raises both the total quantity purchased by consumers and the price the monopolist can charge for his good thus increasing the collected tax revenues. A higher social interest in CSR activities, β, increases both the per unit contributions of the monopolist and the premium he charges for CSR activities without affecting the demand, thus enhancing the the public provision of the public good as well. A larger marginal cost, c, however reduces the public-good maximizing tax rate: it always reduces the tax revenues without affecting the total private investment and thus drags down the overall level of public good. Hence, it is also the case in the complementarity scenario that more inefficient producers should be imposed a lower tax rate to maximize the overall level of public good in the complementarity case. Here it is pointless to collect large tax revenues to finance the government provision if it will not be complemented by a proportional private investment in CSR.

Proposition 9. *In the complementarity case, comparing the tax rate chosen by the regulator under different objectives,* $t_W^{comp} < t_Y^{comp} < t_{TR}$ *always. (proof in the appendix)*

The socially optimal tax rate is always below the public good maximizing tax for the same reason as in the substitution case, that is, it takes into account the negative effect of the tax on both the monopolist's profits and the responsible consumers' utility (both from the prestige of being a responsible consumer and from warm glow). The public good maximizing tax falls below the revenue maximizing one. While t_{TR} aims at maximizing the tax revenues per se, t_Y^{comp} aims at achieving the highest level of public investment that can still be complemented by the monopolist's CSR activities. And since the productivity of the public investment is enhanced by the firm's CSR activities, the need to tax is lower; $t_Y^{comp} < t_{TR}$ always holds.

Figure 4 summarizes the main findings of this section. It contrasts the optimal way a regulator intervenes on a market with CSR activities as well as the main criteria that determine the optimal tax rate, given different objectives and under different production technologies of the public good.

		Production Technology of the Public Good	
		Substitution	Complementarity
The Variable the Regulator seeks to Maximize	Tax Revenues	The tax increases in all factors that either increase the monopolist's unit price (per unit tax proceeds) and/or the total quantity purchased (the tax base) ➔ *Efficient producers are imposed larger taxes* because the demand-reducing effect of the taxes is then lower.	
	Public Good	How well is the producer's business going? Can the regulator extract sufficient tax revenues to offset the part of private investment he crowds out? ➔ *Inefficient producers are imposed lower taxes (or offered higher subsidies)* - because they are both harder to extract tax revenues from and need higher incentives to increase their CSR investments. ➔ *Progressive tax and possibility of a double dividend when t>0: higher income consumers are taxed to allow for the government to crowd out the private investment thus maximizing the level of public good*	How well is the producer's business going? How much of the public investment is needed, given that its productivity is enhanced by the CSR investments? ➔ *Efficient producers are imposed larger taxes* ➔ *Progressive tax and possibility of double dividend: higher income consumers are taxed to maximize the level of public good while exploiting complementarities between private and public investments.*
	Social Welfare	Will the subsidy be absorbed in compensating the lack of profitability of the producer on the private market or will it help increase the CSR content of the product and/or the total CSR investments? ➔ *Efficient producers are given larger subsidies*	Can the regulator increase the taxes without hampering the private investment? To which extent will the producer's profits and the consumers' welfare from warm glow be reduced? ➔ *Efficient producers are imposed larger taxes (lower subsidies)* ➔ *Progressive tax and possibility of a double dividend when t>0: higher income consumers are taxed to increase total welfare.*

Figure 4: The tax rate under Different Scenarios: Summary of the Main Results

4.3 Discussion

Gathering the pieces of the puzzle togehter, we try to answer the question: *when should CSR products be taxed and when should they be exempted?* We argue that tax exemption is not always the best strategy to promoting CSR and enhancing the public good in the economy. Several factors should be considered, such as who are the actual tax payers and who are the main beneficiaries? What will the proceeds of taxation be used for? And finally, what is the social, economic and political context in which the regulator intervenes?

Taxing CSR as a means of redistribution Consider the case of a monopolist producing a private good for which consumers have a high willingness to pay and engaging, alongside its production, in CSR activities for which there is a large social demand - that is large α and/or β. Imposing a consumption tax would lead him to reduce the price he charges for the impure public good he offers on the market, this decrease however is limited since he can always exploit the strong interest in his product. In the complementarity case, the government intervention through a consumption tax can actually be welfare-improving: purchase of the good would be restricted to a narrower group of green consumers, and if we admit social consciousness to be correlated with income, this means that the tax would be paid by the wealthier. While the responsible consumers, who still buy the good after it has been taxed, gain some surplus from both the now higher prestige of being a responsible consumer and from warm glow (if the CSR content per unit increases), their gain is always offset by the loss of consumers with $\theta < \theta^*$ who can no longer purchase the good, and thus the effect on consumer surplus from participation is always negative. However, the overall level of public good available in the economy would increase. The monopolist clearly loses some of his profits. This scenario can be seen as a means for *taxing the richest*, where the wealthier pay more to make the public good available for the poorer. The intuition is close to taxing luxury goods, the mechanism behind however is different, and it is only valid when the firm is sufficiently efficient in the production of its private good, when that good is strongly demanded on the market and when the average social interest in CSR in the economy is sufficiently large.

Our findings suggest that, among producers engaging in CSR, only the efficient ones in the private production should be taxed if the private and public investments are complements. This is because for the inefficient ones, the regulator is unable to extract an amount of tax revenues that would make it worthwhile to tax them. In that case, the tax causes a sharp decrease both in the monopolist's price and total quantities purchased. The resulting tax revenues are then insufficient to finance a decent amount of the government provision of public good to make taxation justifiable. So when the government provision is necessary for the CSR activities to be productive, and when the producer is sufficiently efficient so that his profit margin is sufficiently large for the government to extract revenues from it without causing sharp distorsions, he may choose to tax the good to enhance the overall public good in the economy. A subsidy in the complementarity scenario, when the producer is sufficiently inefficient, means the regulator chooses to yield surplus to both the responsible consumers (whose pool would

then widen) and the monopolist at the cost of an underprovided public good in the economy. In the substitution case, a welfare maximizing regulator would always resort to a subsidy and rather rely on the private provision of the public good[14]. Perhaps if one allows for the productivity of public and private investments in the public good to be imperfect substitutes, the idea of taxing CSR as a means of progressive taxation could appear in the substitution scenario, but under this setup, it does not.

Complements or Substitutes? The regulator should set different tax rates that depend on whether the CSR activity in question complements or substitutes for the government efforts. A *welfare-maximizing* regulator always chooses a lower tax rate (a subsidy) when the CSR activities of the monopolist can substitute for the government provision of the public good than when both forms of investments are complements. This is because a higher degree of government intervention is needed in the case of complementarity, which requires the regulator to raise the taxes.

However, if the objective is to *maximize the overall level of public good* in the economy, we do not have such clearcut answers to which tax rate should be higher, that is, it is not straightforward whether t_Y^{comp} is larger or smaller than t_Y^{subs}. This question is of particular importance when the aim of the regulator is to enhance the provision of a certain public good, either because it is underprovided in the economy and/or it is on the national agenda. For instance, if the aim is to maximize the provision of the public good *children education*, should a firm investing in establishing schools and developing training programs for teachers face the same taxes as another one that finances awareness campaigns about the topic? A priori, one would expect the regulator to grant larger tax privileges to the first. The answer however is not straightforward and different factors are into play.

On the one hand, the government ought to be more free-handed to increase the tax rate and crowd out the private investment in the public good which is always decreasing in the tax rate in the substitution scenario since a reduction in CSR, even though is not desirable, does not reduce the productivity of the government provision of the public good. Whereas the choice of t^{comp} takes into account both the negative effect of a high tax rate on the private investment, and the positive effect of the high tax rate on the public investment up to the point where it is complemented by the former. So a high tax rate would, not only harm the private investment (CSR efforts), but also hampers the public investment due to the existence of complementarity. The government is not able to *surpass* the monopolist in a way. It is then more likely that $t_Y^{subs} > t_Y^{comp}$. But on the other hand, it is useless to reduce the tax in the complementarity case if it still induces the price to fall and hence reduces the tax revenues that are necessary for the government to undertake the public investment which complements the CSR efforts that the tax reduction aims to encourage in the first place. A priori, one would expect t^{comp} to be greater than t^{subs} if it induces the monopolist to increase the CSR content of his product and hence the resulting fall in the unit price would not be sharp, which

[14]When both the government and CSR investtments are equally productive in the public good production.

in turn reduces the fall in the tax revenues. Since his part of the model is difficult to solve analytically, to demonstrate our main argument as simply as possible, we present numerical examples. In table 1, we consider consumers receiving moderate benefits from both the private and CSR components of the good, $\beta = \alpha = 2$, and facing a monopolist who is more or less efficient - c ranges from 0.3 to 1.9.

	c=0.3	c=0.5	c=1	c=1.5	c=1.9
t_Y^{subs}	0.4151	0.3801	0.2599	0.1398	0.0581
t_Y^{comp}	0.3584	0.3489	0.3007	0.2179	0.1385

Table 1: t_Y^{subs} vs. t_Y^{comp} for different values of c, with $\beta = \alpha = 2$

We then assess the impact of varying α and β on the respective values of t_Y^{subs} and t_Y^{comp} in tables 2 and 3.

	$\alpha = 1.3$	$\alpha = 1.5$	$\alpha = 2.5$	$\alpha = 3.5$	$\alpha = 4$
t_Y^{subs}	0.1247	0.1604	0.3684	0.5956	0.7010
t_Y^{comp}	0.2464	0.2631	0.3924	0.3646	0.3826

Table 2: t_Y^{subs} vs. t_Y^{comp} for different values of α, with $\beta = 2$ and $c = 1$

	$\beta = 1.1$	$\beta = 1.3$	$\beta = 2.5$	$\beta = 3$	$\beta = 3.5$	$\beta = 4$
t_Y^{subs}	0.0921	0.1247	0.3684	0.4812	0.5956	0.7010
t_Y^{comp}	0.0471	0.1247	0.3990	0.4920	0.5826	0.6705

Table 3: t_Y^{subs} vs. t_Y^{comp} for different values of β, with $\alpha = 2$ and $c = 1$

The question that arises is: *When the main concern is the amount of public good provided, that is when the public policy aims at maximizing the overall level of public good in the economy, will producers be worse off in the case of complementarity or that of the substitution?* We find that producers will be worse off when providing a CSR investment that complements the public investment rather than substitute for it when (i) they are relatively inefficient, (ii) their private good is weakly demanded on the market and (iii) consumers' interest in CSR activities is not too low and not too high. Tables 1 and 2 show that the public good maximizing tax rate tends to be larger in the case of complementarity when the marginal cost is relatively large ($c \geq 0.8$) and the marginal willingness to pay for the private good is relatively low ($\alpha \leq 3.5$), that is, when the monopolist is likely to increase the CSR content of his product to generate the make-up effect discussed in section 3. In this case, a higher t_Y^{comp} does not cause a sharp decrease in the price and hence the negative effect of a higher tax rate on the total tax revenues is limited *and* so is its negative effect on CSR investments. In the substitution

case, this translates into the trade-off between the private and public investment being in favor of the former and hence t^{subs} is smaller to avoid crowding-out.

The effect of β on this comparison, as can be seen from table 3, is not so direct. For β close to 1 (which is the marginal cost of CSR), it is not worthwhile for the regulator to tax the monopolist in the complementarity case since, on the one hand, there is not much to tax and, on the other, there is not much CSR investment to complement. In the substitution case however the regulator has more incentives to step in and substitute for the monopolist's provision which is very low for this range of values of β. As β increases, not only does the mononpolist's total private investment in the public good increases, but also the fall in the price due to taxation is reduced since consumers now have a higher willingness to pay for the CSR activities (which tend to decrease slightly). This leads to a higher t_Y^{comp} since the regulator can now extract a decent amount of tax revenues *and* has the motive to do so, as the private investment he seeks to complement increases. For this range of values, in the substitution case, the regulator prefers not to crowd out the private provision and hence $t_Y^{subs} < t_Y^{comp}$. For large values of β (precisely for $\beta > 3.3$), the private investment in CSR is quite large, which increases the productivity of the public investment as well if they are complements, thus reducing the need to collect large tax revenues. However in the substitution scenario, the large CSR investments have no effect on government's productivity, $t_Y^{subs} > t_Y^{comp}$. *For sufficiently low and sufficiently large social interest in CSR, to maximize the overall level of public good, the regulator sets a smaller tax rate in the complementarity case*: in the first case, there is not much to tax nor much CSR investment to complement, and in the second, there is no need for high taxes since the large CSR investments enhance the productivity of the public investment.

5 Conclusion

With the widespread of CSR activities and the multiplying number of tax exemptions they are accorded in many economies, questions arise about the positive and normative consequences of these practices as well as the adequate public policy. These questions become even more interesting once the nature of interdependence between the firms' CSR investments and the public good provided through the government - namely whether they are complements or substitutes - is taken into account.

Our first conclusion pertains to the *desirability of CSR*. When examining the pricing strategy of the CSR product, we find that, for each dollar donated to social causes via the purchase of the good, consumers actually pay more than one dollar. That is, the firm always finds it optimal to charge a price premium for the CSR content of its good. This finding raises questions about the desirablility of CSR in a monopoly setup. It is perhaps not the best form of private provision of public goods, unless there are complementarities between the production of the private good and the CSR effort of the monopolist (e.g. a large water-treatment utility setting up a program of digging water wells for poor, remote villages). We also find that CSR is welfare-improving only when the social interest

in such activities or the average willingness to pay for CSR is sufficiently large relative to the willingness to pay for the private good. The impact of a consumption tax imposed on the impure public good is then introduced. The most interesting - and seemingly counterintuitive - result obtained is that a higher tax *increases* the CSR content of the product if the marginal willingness to pay to the marginal cost ratio is higher for CSR activities than for the private good that the monopolist produces, this is referred to as the *make-up effect*: it is as if the producer has two businesses and the tax, reducing the profitabilities of both, disproportionally, induces him to reallocate his ressources so as to focus on the most profitable one.

The choice of the tax rate by a welfare-maximizing regulator is analyzed, assuming that the tax revenues are then recycled in the form of the government provision of a public good, which can either complement or substitute for the CSR investments of the monopolist. While it is always optimal in the case of substitution to subsidize the monopolist, it is optimal to tax him in the complementarity scenario so long as his business is not going so badly, that is if the demand he faces for both his CSR activities and his private good is not too weak and/or he is not too inefficient in the private production. In the latter case, *taxing ethical behaviour*, i.e. the impure public good, may be welfare-improving. The wealthier, those who can afford to purchase the CSR niche product, are then taxed to make the public good available for everyone, in this sense, taxing CSR can be a form of redistribution. Following the same reasoning, in an economy where the public good is underprovided, a good public policy would be to impose a consumption tax on CSR products, whether the private and public investments are complements or substitutes. The public good provision can then be enhanced at the cost of reduced surplus for the responsible consumers and lower profits for the monopolist.

We conclude by pointing out a future research direction that we think is crucial when addressing *CSR and regulation in the context of developing countries*, which is the regulator's ties with businessmen in the economy, referred to as cases of *elite capture*, which is a widespread phenomenon in many developing, but also developed, economies. The case where businessmen use their political connections to enhance both their economic and political stance requires more sophisticated objective functions for the regulator. A corrupt government is usually modeled as a regulator that tries to maximize a weighted sum of the social welfare and a bribe or that tries to enhance its image in order to be re-elected. However corruption goes beyond these specifications in developing countries where the government itself consists of the most important businessmen in the economy. So, in a way, the producers themselves decide on the tax rate that they have to pay. This conflict of interests that occurs in the case of *Business Politicians* will be the topic of the next chapter. Instead of deciding on the tax rate, the business elite will be deciding on the political benefits that come alongside their CSR activities.

6 References

Alves, C. Santos-Pinto, L., 2008. A Theory of Corporate Social Responsibility in Oligopolistic Markets. Cahiers de Recherches Economiques du Département d'Econométrie et d'Economie politique (DEEP), Université de Lausanne, Faculté des HEC, DEEP.

Bagnoli, M., Watts, S., 2003. Selling to Socially Responsible Consumers: Competition and the Private Provision of Public Goods. Journal of Economic Management and Strategy 12, 419-445.

Bansala S., and Gangopadhyay S., 2003. Tax/subsidy policies in the presence of environmentally aware consumers. Journal of Environmental Economics and Management, 45, 333—355.

Baron, D.P., 2001. Private politics, corporate social responsibility, and integrated strategy. Journal of Economics and Management Strategy 10, 7-45.

Baron, D.P., 2003. Private politics. Journal of Economics and Management Strategy 12, 31-66.

Bell, D. V., 2002. The Role of Government in Advancing Corporate Sustainability. Background Paper, Sustainable Enterprise Academy, York University (Canada).

Bénabou, R., Tirole, J., 2010. Individual and corporate social responsibility. Economica, 77, 1-19.

Bergstrom, T., L. Blume, Varian, H., 1986. "On the Private Provision of Public Goods," Journal of Public Economics, 29, 25–49.

Besley, T., Ghatak, M., 2007. Retailing Public Goods: The Economics of Corporate Social Responsibility. Journal of Public Economics, 91(9), 1645-1663.

Bovenberg, A. L., De Mooij, R. A., 1994. Environmental levies and distortionary taxation. The American Economic Review, 1085-1089.

Calveras, A., Ganuza, J.J., Llobet, G., 2006. Regulation, corporate social responsibility and activism. Journal of Economics and Management Strategy.

Chiroleu-Assouline, M., Fodha, M., 2014. From regressive pollution taxes to progressive environmental tax reforms. European Economic Review, 69, 126-142.

Crifo, P., Forget, V. D., 2015. The Economics of Corporate Social Responsibility: A Firm Level Perspective Survey. Journal of Economic Surveys, 29(1), 112-130.

Cornes, R., Sandler, T., 1984. Easy Riders, Joint Production, and Public Goods. Economic Journal, 94, 580–98.

Cornes, R., Sandler, T., 1994. The Comparative Static Properties of the Impure Public Good Model. Journal of Public Economics, 54, 403–21.

Diamond, D. 2009. The Impact of Government Incentives for Hybrid-Electric Vehicles: Evidence from US states. Energy Policy, 37(3), 972-983. European Commission, 2001.

Promoting a European framework for corporate social responsibility. Green Paper and COM 366, Brussels.

Fox, T., Ward, H., Howard, B. 2002. Public Sector Roles in Strengthening Corporate Social Responsibility: A baseline study. Washington, DC: World Bank.

Goulder, L. H., 1995. Environmental taxation and the double dividend: a reader's guide. International tax and public finance, 2(2), 157-183.

John, A., Pecchenino, R., Schimmelpfennig, D., Schreft, S., 1995. Short-lived agents and the long-lived environment. Journal of Public Economics, 58(1), 127-141.

Kitzmueller, M., Shimshack, J., 2012. Economic perspectives on corporate social responsibility. Journal of Economic Literature, 51-84.

Kotchen, M., 2006. Green Markets and Private Provision of Public Goods.Journal of Political Economy, 114, 816-834.

Manasakis, C., Mitrokostas, E., Petrakis, E., 2007. Corporate Social Responsibility in Oligopolistic Markets. Working Paper 0707, University of Crete, Department of Economics.

Manasakis, C., Mitrokostas, E., Petrakis, E., 2013. Certification of Corporate Social Responsibility Activities in Oligopolistic Markets. Canadian Journal of Economics, 46(1), 282-309.

Mitrokostas, E., Petrakis, E., 2007. Public Policy and Private CSR Activities: Complements or Substitutes? CSR Paper 22-2007, University of Crete, Department of Economics.

McWilliams, A., Siegel, D., 2001. Corporate social responsibility: a theory of the firm perspective. Academy of Management Review, 26, 117-127.

Pearce, D. 1991. The role of carbon taxes in adjusting to global warming. The economic journal, 938-948.

Vicary, S., 1997. Joint Production and the Private Provision of Public Goods. Journal of Public Economics, 63, 429–45.

Vicary, S., 2000. Donations to a Public Good in a Large Economy. European Economic Review, 44, 609–18.

7 Appendix

Proof of Proposition 1

Proof.

- From the first derivative $\frac{\partial \pi(s,p)}{\partial p}$, we obtain that $p^*(s) = \frac{\beta+1}{2}s + \frac{\alpha+c}{2}$. Setting $\frac{\partial \pi(s,p)}{\partial s} = 0$ and substituting for $p^*(s)$ yields $s^* = \frac{\beta-1}{\alpha-c}$ that we plug into the foc with respect to p to obtain the optimal price p^*. Checking the second-order conditions:

$$\pi_{pp}|_{s^*,p^*} = -\frac{4(\alpha-c)^2}{[(\alpha-c)^2+(\beta-1)^2]} < 0$$

$$\pi_{ss}|_{s^*,p^*} = -\frac{(\alpha-c)^2[(\alpha-c)^2+(\beta+1)^2]}{(\alpha-c)^2+(\beta-1)^2} < 0$$

$$\pi_{ps}|_{s^*,p^*} = \frac{2(\beta+1)(\alpha-c)^2}{(\alpha-c)^2+(\beta-1)^2}$$

The determinant of the corresponding Hessian matrix is then

$$D|_{s^*,p^*} = \frac{4(\alpha-c)^6}{[(\alpha-c)^2+(\beta-1)^2]^2} > 0$$

Hence (s^*, p^*) is clearly a maximum. Another value that obtains from the FOCs is $s = \frac{\alpha-c}{1-\beta}$, however it is a saddle point as the determinant of the corresponding Hessian matrix is equal to $-\frac{4(\beta-1)^6}{[(\alpha-c)^2+(\beta-1)^2]^2}$ which is always negative.

- For s to be positive, it has to be that $\alpha > c$ *and* $\beta > 1$. To see this, we substitute the optimal values into the aggregate demand which yields $Q^* = \alpha - c$, which is positive only if $\alpha > c$; and hence $s^* = \frac{\beta-1}{\alpha-c} > 0$ only if $\beta > 1$ as well.
If $\alpha > c$ but $\beta < 1$, the monopolist abstains from CSR and sets the price so as to maximize $\pi(p) = 2(p-c)(\alpha-p)$ which yields $p^*|_{s=0} = \frac{\alpha+c}{2}$.

□

Proof of Lemma 3

Proof. In the absence of CSR activities, consumers' surplus is simply given by $CS^0 = \int_0^1 \alpha - pf(\theta)d\theta + Y = \frac{\alpha-c}{2} + 0$, assuming in this scenario that the overall level of public good is null since there is no government intervvention. In the CSR case, total consumer surplus is

$$CS(s,p) = \int_{\theta=0}^{1} [\beta s - (1-\theta)\frac{s^2}{2} + \frac{\theta^*(s,p)-1}{2} + \alpha - p + Y]f(\theta)d\theta$$

Substituting for the value of $p^*(s)$ given by (5):

$$\begin{aligned} CS(s^*,p^*) =& [\frac{\beta-1}{2}s - \frac{s^2}{2}]\int_{\theta^*}^{1} f(\theta)d\theta + \frac{s^2}{2}\int_{\theta^*}^{1}\theta f(\theta)d\theta + Y = \frac{(\beta-1)^2}{4} + Y \\ =& [\frac{\beta-1}{2}s - \frac{s^2}{2}](1-\theta^*) + \frac{s^2}{2}(\frac{1}{2} - \frac{(\theta^*)^2}{2}) + Y \end{aligned}$$

Finally plugging in the equilibrium value of θ^* and using the relation $Y = sQ = \beta - 1$, this expression reduces to:

$$CS(s^*, p^*) = \frac{(\beta-1)^2}{4} + \beta - 1$$

Total welfare in the benchmark model with CSR activities is thus greater than in the absence of CSR iff:

$$\pi(s^*, p^*) + CS(s^*, p^*) > \pi^0 + CS^0$$

$$\frac{(\beta-1)^2}{2} + \frac{(\beta-1)^2}{4} + (\beta-1) > \frac{\alpha-c}{2}$$

Solving the above inequality for $(\beta-1)$ yields $W(s^*, p^*) > W^0$ if $(\beta-1) < -\frac{\sqrt{2}\sqrt{3(\alpha-c)+2}+2}{3}$ - which is always negative and hence there are no CSR activities in this case - or $(\beta-1) > \frac{\sqrt{2}\sqrt{3(\alpha-c)+2}-2}{3}$. □

Proof of Proposition 6

Proof.

- The optimal value of t_{W_1} is obtained from the first-order condition. It is always a maximum as the second derivative yields

$$-\frac{2c^2+1}{2} < 0$$

- Let $x = (t+1)$, the optimal value t_{W_2} that maximizes welfare in the complementarity scenario solves the first order condition given by:

$$3(c^2+1)x^4 - [(2\beta+1)(c^2+1)+c^2]x^3 + [(c^2+1)-(\beta^2+\alpha^2)+\beta c^2]x^2 + (\beta^2+\alpha^2)(\beta-1) = 0$$

Since $\frac{dW_1}{d_t} = 0$ at the optimum, the second order condition can be written as:

$$\frac{dW_1^2}{d^2t} = \frac{dW_1^2}{d^2t} - \frac{dW_1}{d_t} < 0$$

which gives the condition for a maximum:

$$(3t^4+12t^3+17t^2+10t+2)(1+c^2)+(t^2+2t+4)(\alpha^2+\beta^2) < \beta c^2(2t+1)+3\beta(\alpha^2+\beta^2) \tag{19}$$

with both the LHS and the RHS of the above inequality being strictly increasing functions in t. If the slope of the LHS(t) is greater than that of RHS(t), a sufficient condition for the above inequality to hold, for positive values of t, is that, at $t = 0$, the curve representing the LHS(t) be below that of the RHS(t). Setting $LHS(0) = RHS(0)$ we obtain

$$2(c^2+1) + (4-3\beta)(\alpha^2+\beta^2) < \beta c^2$$

that we rearrange to obtain the condition in the proposition. This condition is however unnecessary if $LHS'(t) < RHS'(t)$ in (21).

□

Proof of Proposition 8

Proof. • We first show that the value of t^* obtained from the FOC of t_Y^{subs} in (18) always yields a maximum. To see this, rewrite (18) as:

$$(t+1)^2(2t+1)(c^2+1)+2(t+1)^2=\alpha^2+\beta^2$$

Since the RHS of the above equality is always positive, for $t<0$ it has to be the case that

$$t<-\frac{1}{c^2+1}-\frac{1}{2} \tag{20}$$

Now we show that the SOC in (19) is always satisfied $\forall t^* \lesseqgtr 0$ obtained from the FOC. The SOC being given by:

$$-\frac{(c^2+1)(t+1)^3+(\alpha^2+\beta^2)}{(t+1)^3}<0$$

It is clearly satisfied for both positive values of t^* and for $t>-1$ (such that $(t+1)>0$). Now consider the case where $t<-1$ (which requires that $c^2<1$ as can be seen from (22)), the SOC then reduces to

$$(c^2+1)(t+1)^3<\alpha^2+\beta^2$$

Substracting from the above inequality $(\frac{1}{2}\times FOC|_{t=t^*})$ yields $(1-c^2)(t+1)^2<3(\alpha^2+\beta^2)$, which is always satisfied given the constraints for the monopolist to engage in CSR $\alpha>(t+1)$ and $\beta>(t+1)$ and hence $\alpha^2+\beta^2>(1+c^2)(t+1)^2$ always holds, and given that $\forall c^2<1$, $(1+c^2)>(1-c^2)$.

- Now we compare between t_W^{subs} given in Proposition 6 and (negative values of) t_Y^{subs}. For the welfare-maximizing tax to satisfy the FOC in (18), it has to satisfy (22) as well, that is $\beta<\frac{(3+c^2)(2c^2+1)}{2(c^2+1)}$. Substituting the value of t_W^{subs} into (18) yields a LHS that is smaller than $\alpha^2+\beta^2$ under the above constraint on the value of β, implying that the welfare maximizing tax rate is always smaller (i.e. the subsidy is larger) than the public good maximizing rate t_Y^{subs}.

- To see the second part of the inequality given in the proposition, compare the first-order conditions (16) and (18) for t_{TR} and t_Y^{subs} respectively, which always yield a maximum for positive values of t as demonstrated by the respective second-order conditions (17) and (19). Since the LHS of (18) is simply the sum of the LHS of (16), which is an increasing function of t, and another positive function $(t+1)^2$, $t_Y^{subs}<t_{TR}$ clearly holds $\forall t_Y^{subs}>0$ (and evidently $\forall t_Y^{subs}<0$ in the case of a subsidy since t_{TR} can never be negative).

□

Proof of Proposition 10

Proof. Here we only compare positive values of t_{TR}, t_Y^{comp}, and t_W^{comp} since both a negative t_{TR} and a negative t_Y^{comp} make no economic sense in our setup and a negative t_W^{comp} is clearly smaller than any other tax rate.

- We begin by comparing t_Y^{comp} and t_W^{comp}, the FOCs of which can be respectively re-written as:

$$[(3t^4+10t^3+12t^2+6t+1)-\beta(2t^3+5t^2+4t+1)](1+c^2)+(\alpha^2+\beta^2)[\beta-(t+1)^2]=0 \tag{21}$$

and

$$\begin{aligned}[(3t^4+10t^3+12t^2+6t+1)-\beta(2t^3+5t^2+4t+1)](1+c^2)+(\alpha^2+\beta^2)[\beta-(t+1)^2] \\ =(\alpha^2+\beta^2)+(t+1)^2[\beta-(t+1)-(c^2+1)]\end{aligned} \tag{22}$$

The LHS of both equations being decreasing functions of t (from the second order condition of t_Y^{comp}), $t_Y^{comp} < t_W^{comp}$ whenever $RHS(22) > RHS(23)$, that is

$$(t+1)^2(c^2+1) > (\alpha^2+\beta^2)+(t+1)^2[\beta-(t+1)] \tag{23}$$

Recall that, for the monopolist to engage in CSR, it has to be that $\alpha > c(t+1)$ and $\beta > (t+1)$, so the inequality $(\alpha^2+\beta^2) > (t+1)^2(c^2+1)$ always holds in our model and thus (24) can never be satisfied given the constraints on the parameters, it is always the case that $t_Y^{comp} > t_W^{comp}$.

- Now we compare t_{TR} and t_Y^{comp} with respective FOCs:

$$(2t^3+5t^2+4t+1)=\frac{\alpha^2+\beta^2}{c^2+1} \tag{24}$$

and

$$(2t^3+5t^2+4t+1)=\frac{\alpha^2+\beta^2}{c^2+1}\frac{[\beta-(t+1)^2]}{\beta}+\frac{(t+1)^3(3t+1)}{\beta} \tag{25}$$

The LHS of both equations being increasing in t, $t^{TR} > t_Y^{comp}$ whenever $RHS(26) > RHS(27)$, that is, $3t^2+4t+1 < \frac{\alpha^2+\beta^2}{c^2+1}$, which is always true at the revenue maximizing tax resulting from (26).
Adding those two results together yields the ordering of the different tax rates given in the proposition.

□