Corporate Social Responsibility, Stocks Prices and Tax Policy

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Abstract

We model a capital market in which some proportion of investors get utility from owning firms that undertake spending on corporate social responsibility (CSR). We also assume different categories of firms: those with good CSR fundamentals and those with poor CSR fundamentals. We develop an equilibrium in which investors' CSR considerations influence their financial portfolio decisions, influencing stock prices and corporate CSR spending decisions. An important determinant of the equilibrium is the proportion of altruistic investors in the market. Besides providing a model with reasonable empirical predictions, we also examine optimal tax policy questions, looking to maximize total individual donations plus corporate CSR spending less the tax rebates given for such spending.

1 Introduction

The concept of *corporate social responsibility* (CSR) is becoming more prominent. Hopkins and Cowe (2004) portray CSR as defining the "ethical corporation," and categorize CSR as covering human rights, labor conditions, environmental impacts and health issues. Hopkins and Cowe (2004) point to events that indicate *non-shareholder stakeholders* are becoming increasingly aware of CSR. Increasing globalization makes local regulation of companies more difficult. The Earth Summit of 1992 and anti-globalization protests at the Seattle WTO meetings in 1999 indicate an increasing awareness of CSR. Hopkins and Cowe (2004) report the results of an international survey of CEOs which shows that 79% feel sustainability is necessary to maintain profitability. They report on evidence that *investors* are also becoming more CSR-sensitive.

Existing models of CSR behavior fall primarily into two camps. First, there are models where CSR expenditures improve operating income. For example, providing daycare facilities for employees may attract more productive employees, all else equal, leading to greater revenues and/or lower costs. In these models, CSR expenditures will increase (up to some point) share prices regardless of the ownership structure of the firm.

The second camp of CSR models assumes that CSR expenditures are made because the corporate decision-maker or other, non-shareholder, stakeholders feel better for having supported their community with CSR spending, even with no benefit to operating income. For example, a corporate executive may gain personal utility from donating corporate (i.e., shareholder) funds to sponsor a local little league team.

In contrast, our model assumes: (i) CSR expenditures have no effect on operating cash flows, (ii) corporate decision makers are value maximizers and (iii) at least some investors have preferences for firms' CSR expenditures.

Our paper considers the case of some fraction of investors valuing CSR; that is, some investors gain utility from owning companies that are active in CSR. We will show that investors' portfolio choices impact stock prices in a way that leads value-maximizing managers to make CSR expenditures.

We assume "good" and "bad" firms, where good firms have fundamentally strong ESG characteristics[1] and bad fims do not. We also assume that, at the same level of CSR expenditure, bad firms have a higher marginal impact on investors' utility than good firms.

Why would investors react, in their financial decisions, to CSR? We hypothesize that investors gain utility from their own community involvement and also from corporate social expenditures, in proportion to their holdings in the firm. If an investor owns 5% of a company and it donates a dollar, that gives the investor utility that is equivalent to a personal donation of \$.05.[2]

These social expenditures matter to investors. This means that these concepts will enter equilibrium prices, because investors portfolio decisions will be influenced by CSR activity.

[1]ESG refers to environmental, social and governance characteristics. See for example, the Social Investment Organization.

[2]Of course, it is possible that the investor values \$1 of CSR where he owns 5% of the firm by *more* than \$.05 personal donations.

How should investors react to a company that has a poor CSR record? They could not only avoid holding these firms in their portfolios, they could actually *short* the stock of firms with poor CSR performance. Alternatively, investors could continue to own the firms with poor CSR but use the wealth generated from their portfolio to support their community through personal donations.

There is little theoretical work in finance that explores equilibrium CSR behavior. Heinkel, Kraus and Zechner (2001) and Barnea, Heinkel and Kraus (2004) construct a model in which one class of investors is *assumed* to boycott a class of firms that do not meet their standards for anti-pollution efforts (or other social criteria). If enough investors boycott, the authors show that these neglectful firms can be induced to clean up.

Instead of assuming that one class of investors boycotts (has a zero position in) certain stocks, here we assume one class of investors ("altruistic") has utility from corporate social expenditures, as well as utility from personal social expenditures. This might allow investors to continue to hold stocks that have less-than-perfect social records (to benefit the investors' risk-sharing possibilities) while using their own wealth to gain utility from social expenditures.

Related work in the literature includes Navarro (1988) and Webb (1996) who make the assumption that corporate donations are part of the firm's advertising strategy. Navarro (1988) assumes that corporate CSR spending improves the quantity of sales of the firm's product at any price, while Webb (1996) assumes that CSR spending improves price, at any given output level. Webb (1996) focusses on the issue of corporate giving either directly or through a foundation, in a profit-maximization model. Navarro (1988) also focusses on profit maximization as the objective, but he also allows for the agency possibility that the manager gains personal benefits beyond the profit-maximizing level of CSR. Navarro (1988) examines comparative statics results of the profit-maximization equation, constrained by a takeover threat that limits the agency problem of CSR spending. Alternatively, our interest is in developing equilibrium implications by assuming different types of value-maximizing firms and a market-clearing condition.

Barnea and Rubin (2004) test a model in which management makes CSR expenditures to maximize its own self interest, at the expense of shareholders. They find some evidence consistent with this agency story.

Graff Zivin and Small (2005) develop a simple model that shares some similarities to the one developed here. An investor with utility that is concave in consumption and donations (both hers and a corporation's) makes donations and invests in two riskless firms' shares. One firm makes a fixed donation and one does not. The investor consumes out of the end-of-period riskless cash flows from her shareholdings, less what she donates. There are no frictions in the model, such as taxes. In this simple world, Graff Zivin and Small (2005) develop a "Modigliani-Miller" irrelevance result. Suppose that the investor optimally wishes to donate. The two firms' share prices will be equal and they will be independent of the level of donation made by the donating corporation. The idea is that if the donating firm changes its donation level, the investor can offset the effect of this by altering her private donation. Our model below can duplicate this "irrelevance result" if we assume the conditions in Graff Zivin and Small (2005): (i) assume a riskless technology, (ii) fix exogenously the level of corporate investment and CSR spending, (iii) assume only one type of investor (our "altruistic" investors) and (iv) assume no taxes.

Our equilibrium model, with uncertain output and frictions such as taxes, offers several interesting results. When there are few altruistic investors, their preferences have little impact on market equilibrium and they find it utility-maximizing to short firms with poor CSR records. However, as the fraction of altruistic investors in the economy rises, they do wield market power and value-maximizing firms find it optimal to make CSR expenditures. Each altruistic investor makes personal social contributions that increase as the fraction of altruistic investors rises until, at very high fractions of altruistic investors, each investor may reduce her donation level. The rate of increase in personal donations as the fraction of altruistic investors rises diminishes once firms begin CSR expenditures. Firms do not undertake CSR spending at low fractions of altruistic investors, but do as that fraction rises. If there are caps to the tax rebate provided for CSR spending, firms may continue to increase their CSR spending as the fraction of altruistic investors rises, even without the tax rebate.

Social surplus, defined as the total economy-wide social spending (corporate CSR and personal donations) less the tax rebates given for such spending, is increasing in the fraction of altruistic investors. We examine the tax rebate policy and its impact on social surplus. For example, at an intermediate level of altruistic investors, social surplus is monotonically decreasing in the tax rebate given to individuals; an additional dollar of tax rebate generates less than a dollar of new giving. On the other hand, social surplus is non-monotonic and concave in the corporate tax rebate given to CSR. At low tax rebates, increasing the tax rebate by one dollar generates more than one dollar in new CSR and personal giving. This reverses when the tax rebate is larger.

2 The Model

There are two types of firms: there are N_g *good* firms that, because of their technology, have better corporate social responsibility (CSR) attributes at any social expenditure level than *bad* firms. These fundamentally good firms make social expenditures of D_g each. There are N_b *bad* firms that, because of their technologies, are seen as fundamentally poorer at low levels of social expenditure than good firms. Each *bad* firm can improve its social commitment by making corporate social expenditures of D_b. The entrepreneurs of a firm type j, $j \in \{b, g\}$ can raise K_j dollars, of which $K_j - D_j$ is invested in a production technology that produces normally distributed end-of-period cash flows to investors. The expected end-of-period cash flow of a firm of type j is

$$\mu_j = k_1(K_j - D_j) - (1/2)k_2(K_j - D_j)^2 \tag{1}$$

There are two types of investors: there are I_n *neutral* investors who care only about their financial portfolios, i.e., they ignore CSR behavior; there are also I_a *altruistic* investors who do care about CSR and the dollar equivalent of their utility is enhanced by CSR behavior in the amount $W(D_b, D_g, D_I, x_{ab}, x_{ag})$, where D_I is the donation made by each altruistic investor and x_{ab} and x_{ag} are the number of bad and good firm shares held by an altruistic investor. We assume that altruistic investors have preferences that are separable over wealth and donations and all investors have CARA utility over terminal wealth. For convenience, we also assume that the riskless rate is zero.

Neutral investors choose shareholdings x_{nb} and x_{ng} in bad and good firms to maximize:

$$U_n = x_{ng}\mu_g + x_{nb}\mu_b - \frac{1}{2\tau}[x_{ng}^2\sigma_g^2 + x_{nb}^2\sigma_b^2 + 2x_{ng}x_{nb}\sigma_{bg}]$$

$$-(x_{ng} - \omega_{ng})P_g - (x_{nb} - \omega_{nb})P_b \tag{2}$$

where τ is the investor's risk tolerance.

Good and bad firms have standard deviations of ending cash flows of σ_g and σ_b and the two cash flows have a covariance of σ_{bg}. ω_{nb} and ω_{ng} are each neutral shareholder's endowment of shares in bad and good firms.

Altruistic investors choose shareholdings x_{ag} and x_{ab} in good and bad firms and their individual charitable donations, D_I, to maximize:

$$U_a = x_{ag}\mu_g + x_{ab}\mu_b - \frac{1}{2\tau}[x_{ag}^2\sigma_g^2 + x_{ab}^2\sigma_b^2 + 2x_{ag}x_{ab}\sigma_{bg}]$$

$$-(x_{ag} - \omega_{ag})P_g - (x_{ab} - \omega_{ab})P_b + W(D_b, D_g, D_I, x_{ab}, x_{ag}) - (1 - t_i)D_I \tag{3}$$

where t_i is the personal tax rebate provided to the donor for one dollar of donation.

We choose the following dollar-equivalent of the utility of altruistic investors for donations and corporate social expenditures.

$$W = \alpha_i[u_i D_I - (1/2)vD_I^2] + \alpha_b x_{ab}[u_b D_b - (1/2)vD_b^2 - w_b]$$
$$+\alpha_g x_{ag}[u_g D_g - (1/2)vD_g^2 - w_g] + \beta T - (1/2)\eta T^2 \quad (4)$$

where $T = I_a D_I + N_b D_b + N_g D_g$ is total donations and corporate social expenditures, and α_i, α_b, α_g, β and η are positive constants.

The first term in W is the value to an altruistic investor from her personal donation, D_I, and the second and third terms represent the dollar-equivalent utility of corporate social expenditures by b and g firms. If x_{ab} or $x_{ag} = 0$, then that firm's corporate social expenditures do not benefit the altruistic investor (except through their inclusion in total expenditures, T). The last two terms represent the dollar-equivalent of utility for total corporate social expenditures and donations, $T = N_b D_b + N_g D_g + I_a D_I$.

The constants in W define the participants in this economy. Altruistic investors have $\alpha_j u_j \geq 1$, for $j = \{b, g\}$. As shown below, this means that altruistic investors' utility gains from corporate social expenditures will induce those expenditures at some level of altruistic investors, $\hat{I}_a < I$. $\beta > 0$ and $\eta > 0$ imply that altruistic investors have utility for total social expenditures, as well as for each expenditure separately. This induces some substitutability between personal donations and corporate social expenditures.

Good and bad firms have the same production technologies, but they differ in how altruistic investors view their operations. Specifically, we assume

$$w_b > w_g \tag{5}$$

When neither b or g firms undertake CSR spending, we assume that b firms yield less (perhaps negative) utility to altruistic investors than do g firms. This is the key difference between b and g firms in our model.

We assume

$$u_b > u_g \tag{6}$$

Conditions (5) and (6), together allow that, for sufficiently large CSR spending, investos prefer "bad" to "good" firms.

Entrepreneurs sell the two technologies at their market values: good firms get P_g and bad firms get P_b. Both types of entrepreneurs choose K_j and D_j to maximize:

$$P_j + t_c * \text{Min}\{D_j, \bar{D}_j\} - K_j \tag{7}$$

where t_c is the corporate tax rebate provided by making one dollar of social expenditures[3], as long as the social expenditure is below some limit set by law (expressed in our model as a fraction of μ_j, expected ending cash flow), $\bar{D}_j = l_j \mu_j$.

3 Equilibrium

The investors' first order conditions are:

$$\frac{\delta U_n}{\delta x_{ng}} = \sigma_g^2 x_{ng} + \sigma_{bg} x_{nb} - \tau(\mu_g - P_g) = 0 \tag{8}$$

[3] Note that t_c applies only to CSR expenditures by the firm, as distinct from the firm's tax rate on net income. The latter is reflected in μ_j, which we hold constant in later comparative statics results from varying t_c.

$$\frac{\delta U_n}{\delta x_{nb}} = \sigma_{bg} x_{ng} + \sigma_b^2 x_{nb} - \tau(\mu_b - P_b) = 0 \tag{9}$$

$$\frac{\delta U_a}{\delta x_{ag}} = \sigma_g^2 x_{ag} + \sigma_{bg} x_{ab} - \tau(\mu_g - P_g) - \tau\alpha_g G = 0 \tag{10}$$

$$\frac{\delta U_a}{\delta x_{ab}} = \sigma_{bg} x_{ag} + \sigma_b^2 x_{ab} - \tau(\mu_b - P_b) - \tau\alpha_b B = 0 \tag{11}$$

where

$$B = u_b D_b - (1/2) v D_b^2 - w_b$$

and

$$G = u_g D_g - (1/2) v D_g^2 - w_g$$

from the W function.

$$\frac{\delta U_a}{\delta D_I} = \frac{\delta W}{\delta D_I} - (1 - t_i) = 0$$

or

$$\frac{\delta U_a}{\delta D_I} = \alpha_i(u_i - v D_I) + \beta I_a - \eta I_a T - (1 - t_i) = 0 \tag{12}$$

Solving equations (8) through (11) simultaneously gives:

$$x_{ng}^* = \frac{\tau}{\phi}[(\mu_g - P_g)\sigma_b^2 - (\mu_b - P_b)\sigma_{bg}] \tag{13}$$

$$x_{nb}^* = \frac{\tau}{\phi}[(\mu_b - P_b)\sigma_g^2 - (\mu_g - P_g)\sigma_{bg}] \tag{14}$$

$$x_{ag}^* = \frac{\tau}{\phi}[(\mu_g - P_g)\sigma_b^2 - (\mu_b - P_b)\sigma_{bg} + \alpha_g G \sigma_b^2 - \alpha_b B \sigma_{bg}] \tag{15}$$

$$x_{ab}^* = \frac{\tau}{\phi}[(\mu_b - P_b)\sigma_g^2 - (\mu_g - P_g)\sigma_{bg} + \alpha_b B \sigma_g^2 - \alpha_g G \sigma_{bg}] \tag{16}$$

where $\phi = \sigma_g^2 \sigma_b^2 - \sigma_{bg}^2$.

The market clearing conditions are:

$$I_n x_{ng}^* + I_a x_{ag}^* = N_g \tag{17}$$

$$I_n x_{nb}^* + I_a x_{ab}^* = N_b \tag{18}$$

Substituting the optimal shareholdings (13) - (16) into (17) and (18) yields the equilibrium prices:

$$P_b = \mu_b - \frac{1}{I\tau}[N_g \sigma_{bg} + N_b \sigma_b^2] + \frac{I_a}{I}\alpha_b B \tag{19}$$

$$P_g = \mu_g - \frac{1}{I\tau}[N_g \sigma_g^2 + N_b \sigma_{bg}] + \frac{I_a}{I}\alpha_g G \tag{20}$$

The price of good firms, P_g, is a positive function of the marginal utility, $\alpha_g G = \frac{\delta W}{\delta x_{ag}}$ and the price of bad firms, P_b, is a positive function of the marginal utility, $\alpha_b B = \frac{\delta W}{\delta x_{ab}}$, both multiplied by the fraction of altruistic investors in the economy, $\frac{I_a}{I}$.

Substituting these equilibrium prices back into the investors' shareholdings shows:

$$x_{nb}^* = \frac{N_b}{I} - (\frac{I_a}{I})(\frac{\tau}{\phi})[\alpha_b B \sigma_g^2 - \alpha_g G \sigma_{bg}] \tag{21}$$

$$x_{ng}^* = \frac{N_g}{I} - (\frac{I_a}{I})(\frac{\tau}{\phi})[\alpha_g G \sigma_b^2 - \alpha_b B \sigma_{bg}] \tag{22}$$

$$x_{ab}^* = \frac{N_b}{I} + (\frac{I_n}{I})(\frac{\tau}{\phi})[\alpha_b B \sigma_g^2 - \alpha_g G \sigma_{bg}] \tag{23}$$

$$x_{ag}^* = \frac{N_g}{I} + (\frac{I_n}{I})(\frac{\tau}{\phi})[\alpha_g G \sigma_b^2 - \alpha_b B \sigma_{bg}] \tag{24}$$

where

$$I_n = I - I_a$$

In the absence of social expenditure considerations, given their identical preferences and beliefs, altruistic and neutral investors would hold $\frac{N_b}{I}$ and $\frac{N_g}{I}$ shares of bad and good firms, respectively. However, because altruistic investors value corporate social expenditures, the two types of investors hold different amounts of each firms' shares.

The difference in holdings from $\frac{N_b}{I}$ and $\frac{N_g}{I}$ depends upon the marginal utility of social expenditures versus risk. Suppose, for example, that $\frac{\alpha_g G}{\sigma_{bg}} < \frac{\alpha_b B}{\sigma_b^2}$ (see equation (24)): the reward-to-risk of g holdings for the altruistic investor is less than the reward-to-risk of b holdings. In this case, $x^*_{ag} < \frac{N_g}{I}$. Then, from equation (22), neutral investors will hold more than $\frac{N_g}{I}$.

The altruistic investor must also choose her charitable donation, D_I. Equation (12) shows that the optimal personal contributions are the maximum of zero or

$$D_I^* = \frac{\alpha_i u_i + \beta I_a - \eta I_a(N_b D_b + N_g D_g) - (1 - t_i)}{\alpha_i v + \eta I_a^2} \tag{25}$$

Finally, the firms choose K_j and D_j to maximize $P_j + t_c * \text{Min}\{D_j, \bar{D}_j\} - K_j$. The resulting first-order conditions for K_j^* and D_j^*, respectively, are:

$$k_1 - k_2(K_j^* - D_j^*) - 1 = 0 \tag{26}$$

and, for $D_j < \bar{D}_j$,

$$-k_1 + k_2(K_j^* - D_j^*) + \frac{I_a}{I}\alpha_j(u_j - vD_j^*) + t_c = 0. \tag{27}$$

The first two terms in the D_j^* first order condition are equal to -1 by the first-order condition for K_j^*. The third term, the "price effect," is $\frac{\delta P_j}{\delta D_j}$, which represents the marginal utility of a dollar of social expenditure by firm j. The last term is the tax rebate generated by firm j with a dollar social expenditure. Since $t_c < 1$, the first order condition for D_j at $D_j = 0$ shows that a small I_a could lead to an optimal negative D_j, which is not allowed. Thus, for some range of I_a, $D_j^* = 0$.

When the firm's CSR spending reaches $\bar{D}_j = l_j \mu_j$, the firm can spend more than $\bar{D}_j$ but will receive a tax rebate only on expenditures up to $\bar{D}_j$. It is easy to show that, if altruistic investors value CSR enough, firms may spend $D_j > \bar{D}_j$. Thus, there are four regions that define optimal CSR spending:

(i) If the left-hand side of equation (27) is negative at $D_j^* = 0$:

$$D_j^* = 0 \tag{28}$$

(ii) If the left-hand side of equation (27) is positive at $D_j^* = 0$ and is negative at $D_j^* = \bar{D}_j$:

$$D_j^* = \frac{1}{v}[u_j - (\frac{I}{I_a})(\frac{1}{\alpha_j})(1 - t_c)] \tag{29}$$

(iii) If the left-hand side of equation (27) is positive at $D_j^* = \bar{D}_j$ and is negative when $D_j^* = \bar{D}_j$ *and* $t_c = 0$:

$$D_j^* = \bar{D}_j \tag{30}$$

(iv) If the left-hand side of equation (27) is positive when $D_j^* = \bar{D}_j$ *and* $t_c = 0$:

$$D_j^* = \frac{1}{v}[u_j - (\frac{I}{I_a})(\frac{1}{\alpha_j})] \tag{31}$$

We define the critical I_a values where each D_j^* switches from zero to positive: $\hat{I}_{ab}$ and $\hat{I}_{ag}$, where $D_b^* = 0$ for $I_a < \hat{I}_{ab}$ and $D_g^* = 0$ for $I_a < \hat{I}_{ag}$.

For exposition, we compute a numerical example of the equilibrium for various levels of I_a. The input parameters are:

$k_1 = 6$	$\tau = 200$	$\alpha_i = 1$
$k_2 = 1$	$u_i = 3$	$\alpha_b = 1$
$\sigma_b = 20$	$u_b = 2$	$\alpha_g = 1$
$\sigma_g = 20$	$u_g = 1$	$\beta = 6$
$\sigma_{bg} = 200$	$v = 1$	$\eta = .5$
$N_b = 0.5$	$w_b = 1$	$I = 1.0$
$N_g = 0.5$	$w_g = -1$	$l_j = .05 \; j = b, g$
$t_c = 0.4$	$t_I = 0.3$	

The key parameters to define good (type g) and bad (type b) firms are the w_j and u_j. Bad firms are considered worse than good firms when there are no CSR expenditures, but altruistic investors' marginal utility for a small change in D_b is higher than it is for a small change in D_g. Personal donations have an even higher marginal utility. Changing some of the parameters above can result in qualitative changes in the equilibrium relationships.

Equilibrium values for various levels of I_a are shown in Table 1.

4 The Impact of the Proportion of Altruistic Investors

Table 1 demonstrates how changes in the proportion of altruistic investors in the economy affects investor and firm behavior. As a base case, we use $I_a = .40$. At this level, investors make individual charitable donations and type b firms make CSR expenditures. Here we summarize signficant aspects of firm and investor behavior.

Equilibrium Relationships (derivations in the Appendix)

(a) At low levels of I_a, it may be optimal for the altruistic investor to short firm b's shares (i.e., $x_{ab} < 0$).

(b) Sufficient conditions for $0 < \hat{I}_{aj}/I < 1$ and $\hat{I}_{ab} < \hat{I}_{ag}$ are $\alpha_j u_j > 1-t_c$, $j \in \{b, g\}$, and $\alpha_b u_b > \alpha_g u_g$, respectively. For $I_a > \hat{I}_{aj}$, D_j^* is increasing in I_a.

(c) $K_j^* - D_j^*$, $j \in \{b, g\}$ are independent of the number of altruistic investors.

(d) At very high levels of I_a, it is possible that firms will make CSR expenditures even past the amount that generates a tax rebate. In the base case, b firms exceed the tax rebate upper limit when there are approximately 90% altruistic investors.

(e) Stock prices, P_b and P_g, may be non-monotonic in the fraction of altruistic investors.

(f) Type b firms' stocks can have higher expected returns than g firms' stock.

(g) The donation per individual altruistic investor, D_I^*, may be non-monotonic in I_a.

We briefly comment on each of these results.

(a) See Figure 1.

(b) See Figure 3. In our numerical example, $\hat{I}_{ab}/I = .35$ and $\hat{I}_{ag}/I = .65$ and for larger I_a, D_b^* and D_g^* are increasing with I_a. At a sufficient proportion of altruistic investors, firms will make CSR expenditures, with type b firms starting at lower I_a than type g firms. As seen in equation (27), when $I_a = 0$, a dollar of CSR only generates a tax shield of $t_c < 1$ but has no effect on price, making such expenditures unattractive. However, when $I_a > \hat{I}_{aj}$, the combination of the impact on price in addition to the tax shield is great enough to make the social expenditure profitable.

(c) Optimal firm investment is independent of the number of altruistic investors. This follows from equation (26), the first order condition for K_j. The amount of funds raised, K_j^*, increases dollar for dollar as CSR expenditures increase.

(d) At intermediate levels of I_a, the combination of the stock price effect of CSR spending, plus the tax rebate, generates the CSR spending. If the tax rebate limit, l_j, is small enough, and the price impact large enough, firms may do CSR spending past the amount generating a rebate just for the price effect. In the numerical example in Table 1, D_b exceeds that amount ($\bar{D}_b = l_b \mu_b = .875$) if I_a is above .90. See Figure 3. Past this point, the preponderance of altruistic investors means that the price impact of CSR expenditures is so great that no additional tax rebate incentive is required.

(e) The non-monotonicity of prices is seen in Figures 2. For example, as I_a increases from 0 to 1, P_b first decreases, due to reduced risk sharing, until D_b goes positive and starts increasing in I_a. P_b then increases until D_g becomes positive. The increasing attractiveness of g firms causes P_b to then grow more slowly over the remainder of the I_a range.

(f) The expected returns to the firms, $E(r_j) = (\mu_j/P_j) - 1$, differ whenever the stock prices differ since both firms have the same production technology and so set the same expected end-of-period cash flows, $\mu_b = \mu_g$. The pattern of expected returns as I_a changes is, therefore, just the inverse of the stock price patterns described above. As seen in Table 1, for all levels of I_a, $P_g > P_b$ so that $E(r_b) > E(r_g)$.

Altruistic investors, because of non-pecuniary reasons, underweight (or short) b firms[4] and hence overweight g firms. In our numerical example, this causes a and n investors to obtain different portfolio expected returns[5]. Result (e) above, combined with the portfolio holding biases of altruistic investors leads to, in our numerical example, altruistic investor portfolios having lower expected returns than neutral investor portfolios.

There is a large and growing body of evidence on relative returns of firms with differing CSR expenditures, much of it mixed or finding no significant return differences. This could result from, as indicated by our model, there being too few altruistic investors, so that the prices (and the expected re-

[4]When there are few altruistic investors, their best tool for gaining utility is to short the bad firms. In our numerical example, for small I_a, $\alpha_b B/\sigma_{bg} - \alpha_g G/\sigma_g^2 < 0$ which implies that, for small I_a, $x_{ab} < 0$ and $x_{nb} > N_b/I$. In this example, altruistic investors short b shares as long as $I_a < .3$.

[5]We assume that $r_f = 0$, so the returns we refer to here are excess returns over r_f.

turns) of b and g firms do not differ significantly. One paper which finds that CSR activity does reduce returns, as our model predicts, is Brammer, Brooks and Pavelin (2005). They use measurements of CSR activity for British firms provided by the Ethical Investment Research Service, which encompass more CSR activity than just corporate donations. They note: "firms with higher social performance scores tend to achieve lower returns, while firms with the lowest possible CSP scores of zero considerably outperformed the market."

(g) See Figure 4. The possible non-monotonicity of D_I^* in I_a can be seen from equation (25). At small I_a, corporate CSR is constant at zero and an increase in I_a causes the altruistic investor to increase her donation. At large I_a and a sufficiently small β (the altruistic investor's concern for total CSR and charitable giving), then increasing corporate CSR (with I_a) allows the altruistic investor to reduce her donation.

Our numerical example produces one more fact that leads into our subsequent discussion of tax policy and social welfare. Total CSR expenditures and donations, $T = I_a D_I^* + N_b D_b^* + N_g D_g^*$, is monotonically increasing in I_a. Altruistic investors contribute on their own, but they also induce firms to make social expenditures by affecting stock prices.

More specifically, in our numerical example we see that D_I^* is increeasing in I_a so that, total individual contributions, $I_a D_I^*$, is also increasing in I_a. Also, we see that corporate CSR, D_j^*, $j = \{b, g\}$, is non-decreasing in I_a. Thus, as I_a increases, total individual donations and corporate CSR will appear to be positively correlated. This contrasts with the static, fixed I_a

case in which, because $\eta > 0$ in equation (25), individual donations and corporate CSR are *substitutes*: if corporate CSR is exogenously increased, then optimal individual donations would decrease.

This result has an interesting interpretation. If we assume that our one-period model applies over time, with I_a increasing in a way that is totally unanticipated by entrepreneurs and investors, then we would see both total personal donations and corporate social expenditures moving up in a highly correlated way. Thus, it would appear, over time, that personal donations and corporate social expenditures are *complements*, not substitutes.

As a simple test of this implication, we gathered data on total individual and corporate charitable giving from a publication titled Giving USA: the Annual Report on Philanthropy[6]. We divided total personal donations per year by annual GDP and also divided total corporate donations by GDP. The correlations between these donations is -.01 from 1954 to 2001, .147 from 1981 to 2001 and .298 from 1991 to 2001.

These correlations are substantially less than what our model would predict. This could be due to many factors. It is highly likely that more is changing over time than just I_a. Investors' utility for CSR spending may be changing in ways that are not related to wealth (GDP). In addition, our measure of corporate CSR spending is restricted only to charitable giving; we cannot measure how much of their capital budget is devoted to CSR-like expenditures that are not classified as donations. The correlation did grow as the observation period was shortened to just the last ten years.

[6] See the bibliography.

Perhaps only in this period are many investors recognizing their utility for CSR spending.

5 The Impact of Tax Policy Parameters

In our numerical example with $I_a = .40$, b firms are donating, but below the maximum allowable for tax deduction purposes. This appears to be the case empirically. Evidence from the publication Giving USA: the Annual Report on Philanthropy, lists tax-deductible donations as a fraction of net income before taxes, by industry, for 1998. Most industries were well below the maximum of 10%: Finance and Insurance gave .4%; Manufacturing gave 1.4% and Information gave 2.1%. The largest donating industries were Agriculture (8.3%) and Mining (8.1%).

In our numerical example g firms will not donate until a larger proportion of altruistic investors appears. The above evidence also suggests that, consistent with our result that $D_b^* > D_g^*$, b firms spend more on CSR than do g firms. Mining would be considered much more of a b industry and information technology much more of a g firm.

Brammer, Brooks and Pavelin (2005) offer evidence on British firms' CSR activity, using measurements of CSR activity for British firms provided by the Ethical Investment Research Service. The two industries with the highest measures of CSR activity were utilities and resource companies, which includes oil and energy companies. In fact, near the top of the CSR measures were British Petroleum, Shell and British Energy. These industries would certainly fall into our b-type category, as opposed to information technology and cyclical consumer companies (g firms) that had the lowest CSR activity measures.

The big social contributors are individuals. With $I_a D_I^* = 1.722$ and $N_b D_b^* + N_g D_g^* = .25$, the ratio of personal donations to corporate CSR is almost 7 times. If we take recent levels of personal donations relative to business donations (source: Giving USA: the Annual Report of Philanthropy) this ratio is about 15 times. However, we believe that the reported corporate contributions underestimate the amount of CSR spending because some amount of CSR is not actual donations but capital expenditures or normal business expenses. As I_a changes from 0 to 1, both total personal donations, $I_a D_I^*$, and corporate social expenditures, $N_b D_b^* + N_g D_g^*$, increase.

In this section we examine, through our numerical example, the optimality of tax policy. For a given proportion of altruistic investors, I_a, tax policy, in the form of parameters t_i, t_c and $l_j = \frac{\bar{D}_j}{\mu_j}$, will impact the level of total donations, $T = I_a D_I^* + N_b D_b^* + N_g D_g^*$, as well as the cost of lost tax revenues, $C = I_a t_i D_I^* + N_b t_c \text{Min}\{D_b^*, \bar{D}_b\} + N_g t_c \text{Min}\{D_g^*, \bar{D}_g\}$. We define $T - C$ as the *social surplus* of total donations and CSR expenditures less the tax cost of inducing this activity: $SS = T - C$.

Observation 1 In our numerical example, social surplus is monotonically decreasing in t_i, the tax rebate given for personal donations. See Figure 5.

An additional dollar of tax rebate to individuals does not generate an additional dollar of total CSR and personal donations. This is because corporate donations (see equations (28) to (31)) are independent of the tax rebate given to individuals. Thus, while individuals give more as t_i increases, corporations don't, and marginal total donations are less than the marginal tax rebates given. This is because a tax rebate increase generates a marginal increase in personal donations, but the new higher tax rebate rate applies to *all* the personal donations, not just the marginal increase. So, in our model, allowing individuals to deduct donations does not appear to be an efficient policy.

Observation 2 In our numerical example, social surplus is non-monotonic and concave in the corporate tax rebate, t_c.

Figure 6 plots, as a function of the rebate rate on corporate CSR, t_c, total individual donations plus corporate CSR expenditures, T, and lost tax revenue, C, and the difference, termed social surplus, SS, for the case when $I_a = .40$. Other levels of I_a offer qualitatively similar results. There are three relevant segments to the plots.

In the first segment ($t_c < .20$), neither b nor g firms make CSR expenditures. And, individual donations, D_I^*, are independent of t_c. Thus, T is limited to (constant) individual donations, C is a constant, and so is SS.

In the second segment ($.20 < t_c < .55$) D_b^* becomes non-zero and increases with t_c. Because CSR spending is rising, so is C, but at a slower rate, so SS is increasing in this tax region. In this segment the tax rebate is not enough to induce g firms to make CSR expenditures.

In the third segment ($t_c > .55$), b firms reach their rebate limit ($\bar{D}_b = .875$) and g firms are not yet induced to make CSR expenditures. Total donations rise, but the higher tax rebate, which applies to *all* donations, not just the marginal ones, causes C to rise faster than T, bringing SS down. g donations begin but are not big enough to increase SS.

At many levels of I_a, we can find an interior optimum to the social surplus, as a function of t_c, given the tax rebate limits, l_j.

Observation 3 The optimal rebate rate, t_c, that maximizes social surplus, varies with the upper limit on tax-deductible CSR expenditures, l_j. See Figures 7 and 8.

Using our numerical example, at $I_a = .40$:

A limit of:	optimal tax rebate rate of	for a social surplus of:
.02	.34	1.3249
.04	.48	1.3824
.05	.55	1.3927
.06	.62	1.3990
.08	.67	1.4063
.10	.67	1.4063

This can be seen in Figure 8. As we move from left to right (increasing l_j), the rebate rate, t_c, that maximizes social surplus increases until the maximum social surplus continues to occur at $t_c = .67$ and remains constant at 1.4063.

A tight upper limit on the amount of CSR that generates a tax rebate, $l_j = .02$, leads to a lower optimal tax rebate rate, t_c, and a lower (maximum) social surplus, 1.3249, than if the limit is $l_j = .06$.

However, loosening the upper limit beyond some point does not change the optimal rebate rate. From above, the optimal t_c remains at .67 at a limit of $l_j = .07$ (or higher). So, as l_j increases beyond about $l_j = .07$, total donations and tax revenue lost remain constant, meaning that social surplus is also constant.

This result has policy implications. Whatever the reason for limiting the tax rebate on CSR spending (e.g., agency concerns), the tax rebate rate that maximizes social surplus is a function of the chosen l_j, only if l_j is below some point (about $l_j = .07$ in our numerical example). If l_j is above this point, the optimal t_c is the same for any l_j.

This optimal (l_j, t_c) relationship only holds for intermediate values of I_a. At low values of I_a, $D_b > 0$ does not occur until very large tax rebate rates are offered and $D_g = 0$ for all tax rebate rates. Since individual donations are independent of these policy variables, social surplus is low and quite insensitive to l_j and t_c.

At high values of I_a, the optimal tax rebate rate for almost any limit is $t_c = 0$. In these cases, the market power of altruistic investors is so great that no tax incentive is necessary to generate social surplus.

6 Conclusion

This paper assumes that CSR spending is not just a way of increasing revenues or decreasing costs. In fact, one could argue that such expenditures should not even be called CSR spending.

We define CSR spending as having utility for some investors. By assuming that some investors gain utility from owning firms that practice CSR, we show how this concern impacts investors' risk-sharing opportunities, equilibrium prices and so, value-maximizing firms' decisions about practicing CSR.

We choose a set of parameter values, shown in Table 1, with $I_a = .40$, that provides an equilibrium with empirically reasonable implications, including:

- Both types of investors hold both types of firms. Altruistic investors hold the stock of firms with poor CSR fundamentals, but less than is optimal from a pure risk-sharing viewpoint. This requires neutral investors to hold more of the firms with poor CSR fundamentals than they would prefer for risk-sharing, leading to poor-CSR firms' stock price being less than good-CSR firms. Since both firms make the same optimal investment, the P/E ratio for the poor-CSR firms is lower than the P/E ratio for the (risk-equivalent) good-CSR firms.

- This investor behavior induces firms with poor CSR fundamentals to improve their CSR record ($D_b > 0$). At higher proportions of altruistic investors, firms with better CSR fundamentals also spend on CSR ($D_g > 0$), but they spend less than the firms with poor CSR fundamentals. Empirical evidence from US and British firms confirms this implication.

- Investors also make individual donations which, in aggregate, are several times the size of corporate social spending, consistent with empirical evidence.

- If, over time, I_a/I, the fraction of investors that value CSR spending, increases in a way that is unanticipated by investors, both individual donations, I_aD_I, and corporate CSR spending, $N_bD_b + N_gD_g$, will increase with a very high correlation, making them appear as complements, despite the aspect of substitutability built into the assumed utility function of altruistic investors. Empirically, the correlation of corporate and individual donations has increased over the last two decades.

We also find that policy variables, t_i, t_c and l_j, influence the social surplus in important ways. First, for many parameter values, social surplus is monotonically decreasing in the tax rebate given to individual donations, t_i. Because changing the individual tax rebate rate does not influence corporate CSR spending, raising the rebate rate generates less new individual donations than the additional tax rebates given, causing social surplus to be lower.

Second, social surplus is non-monotonic in the corporate tax rebate. That is, there is a social-surplus-maximizing level for the corporate tax rebate rate, for any given set of parameters.

One of the important parameters is l_j, the limit on net income that can be used for CSR spending *and* qualify for a tax rebate. Any CSR spending beyond l_j generates no additional tax rebate. We take the rebate limit as given. This limit may exist as a political compromise between groups favoring CSR tax rebates and those that feel such spending is outside the area of corporate responsibility. Or some may view CSR spending as an agency problem, benefitting management at the expense of shareholders.

Whatever the reason for the tax rebate limit, its level influences the social surplus-maximizing level for the corporate tax rebate rate. Raising the tax rebate limit leads to higher optimal tax rebate rates, up to a maximum, past which the optimal tax rebate rate is constant.

As corporate social responsibility rises in prominence, its impact on capital market equilibrium and optimal CSR behavior will increase. This paper begins to explore that equilibrium.

(b) By setting the right-hand side of equation (29) equal to zero and solving for $\hat{I}_j/I$ yields $\frac{\hat{I}_j}{I} = \frac{(1-t_i)}{\alpha_j u_j}$. Thus, a sufficient condition for $\hat{I}_j/I < 1$ is $1 - t_i < \alpha_j u_j$. This also demonstrates that $\alpha_b u_b > \alpha_g u_g$ is sufficient for $\hat{I}_b < \hat{I}_g$.

(c) This follows from solving equation (26).

(d)The simplest case involves $I_a = I$. Using this in equation (**??**), it is apparent that for the following parameter restrictions: (i) big u_j, (ii) small v and (iii) small l, then $D_j^* > l\mu_j$. To solve for the new optimal CSR expenditure, we choose ϵ_j in $l\mu_j + \epsilon_j$ to maximize $P_j - K_j$, but with no tax rebate for donations above $l\mu_j$ This yields $l\mu_j + \epsilon_j^* = \frac{1}{v}(u_j - \frac{1}{\alpha_j})$ so that $\epsilon_j^* > 0$ is feasible under the parameter restrictions above.

(e) Taking the derivative with respect to I_a of price equations (19) and (20) shows the sources of the non-monotonicity. Using the equation for P_b and the definitions $B = u_b D_b - (1/2)vD_b^2 - w_b$ and $G = u_g D_g - (1/2)vD_g^2 - w_g$ we can write $\frac{\partial P_b}{\partial I_a} = \frac{\alpha_b}{I} B + \alpha_b \frac{I_a}{I}(u_b - vD_b)\frac{\partial D_b}{\partial I_a}$. We choose u_b and v such that $B < 0$ and $(u_b - vD_b) > 0$. We know that $\frac{\partial D_b}{\partial I_a} > 0$ so that the first term in $\frac{\partial P_b}{\partial I_a}$ is negative and the second is positive. Then at small I_a, the first negative term dominates so that P_b is decreasing in I_a. At intermediate I_a where $\frac{\partial D_b}{\partial I_a} > 0$, the second, positive, term can dominate so that P_b increases with I_a. Finally, at high I_a, CSR expenditures reach the maximum that qualifies for a tax rebate and so $\frac{\partial D_b}{\partial I_a} = 0$ and the first negative term again dominates.

(f) $P_b \leq P_g$ and $\mu_b = \mu_g$ are sufficient for $E(r_b) \geq E(r_g)$.

(g) Equation (25) shows the altruistic investor's optimal donation. Taking the derivative with respect to I_a yields two terms. The first is positive, at least at low I_a values, and the second is negative. At $I_a = 0$, where $D_b^* = D_g^* = 0$, only the positive term exists. At high I_a, it is easy to show that a small enough β is sufficient to have D_I^* decreasing in I_a.

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Table 1: Equilibrium values for various levels of I_a / I

Ia	Pb	Pg	Xng	Xnb	Xag	Xab	Mub	Mug	Kb	Kg	Db	Dg	DI	Ia*DI	Nb*Db	Ng*Dg	T	C	SS
0.000	16.000	16.000	0.500	0.500	1.500	-0.500	17.500	17.500	5.000	5.000	0.000	0.000	2.301	0.000	0.000	0.000	0.000	0.000	0.000
0.050	15.950	16.050	0.450	0.550	1.450	-0.450	17.500	17.500	5.000	5.000	0.000	0.000	2.597	0.130	0.000	0.000	0.130	0.039	0.091
0.100	15.900	16.100	0.400	0.600	1.400	-0.400	17.500	17.500	5.000	5.000	0.000	0.000	2.886	0.289	0.000	0.000	0.289	0.087	0.202
0.150	15.850	16.150	0.350	0.650	1.350	-0.350	17.500	17.500	5.000	5.000	0.000	0.000	3.164	0.475	0.000	0.000	0.475	0.142	0.332
0.200	15.800	16.200	0.300	0.700	1.300	-0.300	17.500	17.500	5.000	5.000	0.000	0.000	3.431	0.686	0.000	0.000	0.686	0.206	0.480
0.250	15.750	16.250	0.250	0.750	1.250	-0.250	17.500	17.500	5.000	5.000	0.000	0.000	3.685	0.921	0.000	0.000	0.921	0.276	0.645
0.300	15.700	16.300	0.200	0.800	1.200	-0.200	17.500	17.500	5.000	5.000	0.000	0.000	3.923	1.177	0.000	0.000	1.177	0.353	0.824
0.350	15.836	16.350	0.212	0.726	1.035	0.080	17.500	17.500	5.286	5.000	0.286	0.000	4.122	1.443	0.143	0.000	1.586	0.490	1.096
0.400	**15.950**	**16.400**	**0.217**	**0.667**	**0.925**	**0.250**	**17.500**	**17.500**	**5.500**	**5.000**	**0.500**	**0.000**	**4.306**	**1.722**	**0.250**	**0.000**	**1.972**	**0.617**	**1.356**
0.450	16.050	16.450	0.217	0.617	0.846	0.357	17.500	17.500	5.667	5.000	0.667	0.000	4.472	2.012	0.333	0.000	2.346	0.737	1.609
0.500	16.140	16.500	0.213	0.573	0.787	0.427	17.500	17.500	5.800	5.000	0.800	0.000	4.622	2.311	0.400	0.000	2.711	0.853	1.858
0.550	16.202	16.550	0.201	0.549	0.745	0.460	17.500	17.500	5.875	5.000	0.875	0.000	4.760	2.618	0.438	0.000	3.055	0.960	2.095
0.600	16.220	16.600	0.173	0.553	0.718	0.465	17.500	17.500	5.875	5.000	0.875	0.000	4.889	2.933	0.438	0.000	3.371	1.055	2.316
0.650	16.239	16.698	0.114	0.574	0.708	0.460	17.500	17.500	5.875	5.077	0.875	0.077	4.991	3.244	0.438	0.038	3.720	1.164	2.556
0.700	16.257	16.793	0.057	0.593	0.690	0.460	17.500	17.500	5.875	5.143	0.875	0.143	5.078	3.554	0.438	0.071	4.063	1.270	2.793
0.750	16.275	16.885	0.002	0.611	0.666	0.463	17.500	17.500	5.875	5.200	0.875	0.200	5.150	3.863	0.438	0.100	4.400	1.374	3.026
0.800	16.294	16.975	-0.052	0.629	0.638	0.468	17.500	17.500	5.875	5.250	0.875	0.250	5.208	4.167	0.438	0.125	4.729	1.475	3.254
0.850	16.312	17.063	-0.105	0.646	0.607	0.474	17.500	17.500	5.875	5.294	0.875	0.294	5.254	4.466	0.438	0.147	5.050	1.574	3.477
0.900	16.344	17.150	-0.152	0.654	0.572	0.483	17.500	17.500	5.889	5.333	0.889	0.333	5.285	4.756	0.444	0.167	5.367	1.669	3.699
0.950	16.424	17.236	-0.182	0.629	0.536	0.493	17.500	17.500	5.947	5.368	0.947	0.368	5.297	5.032	0.474	0.184	5.690	1.758	3.932
1.000	16.500	17.320	-0.213	0.607	0.500	0.500	17.500	17.500	6.000	5.400	1.000	0.400	5.300	5.300	0.500	0.200	6.000	1.845	4.155

Figure 1
Altruistic investor demands

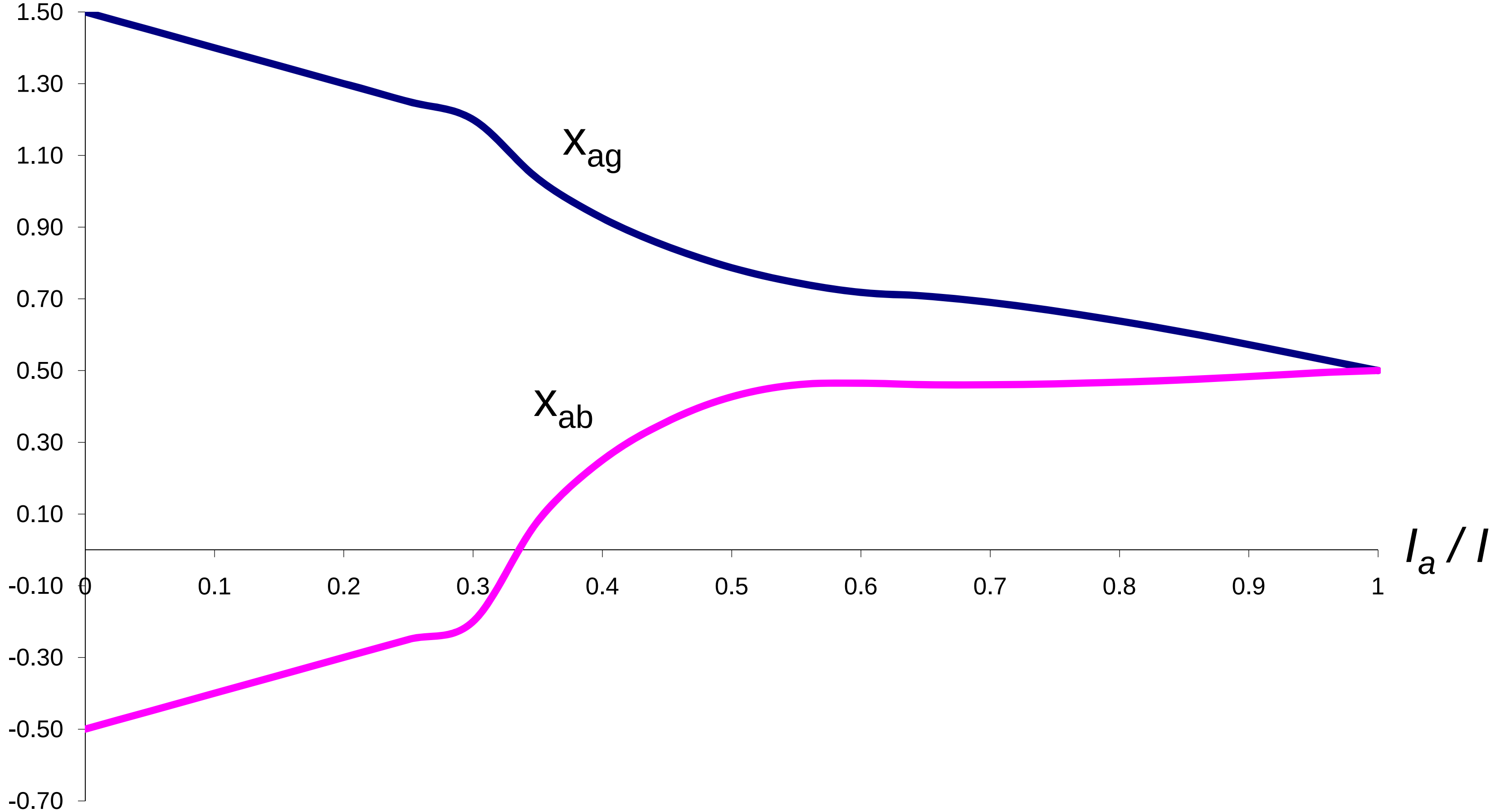

Figure 2
Equilibrium stock prices

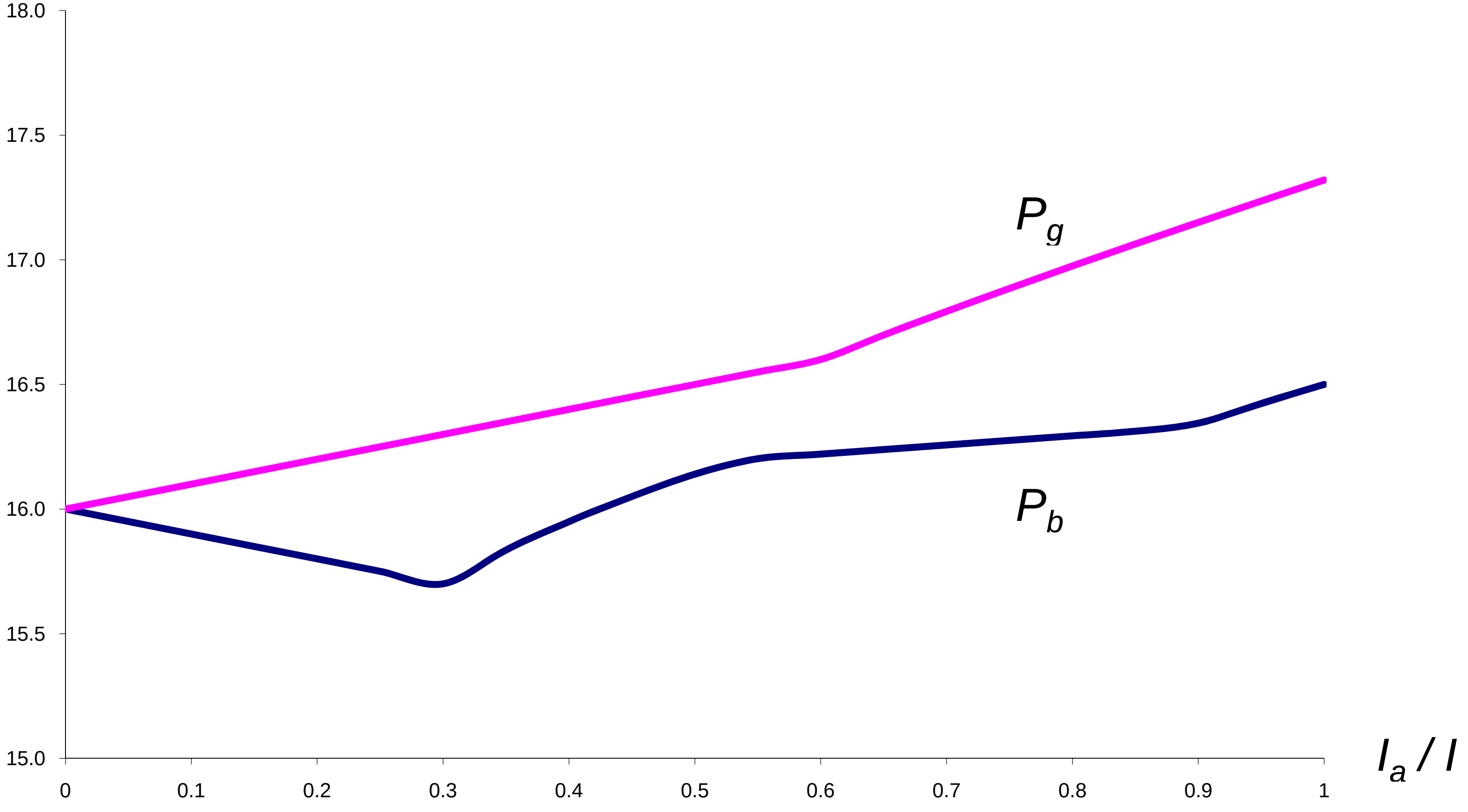

Figure 3
CSR expenditures

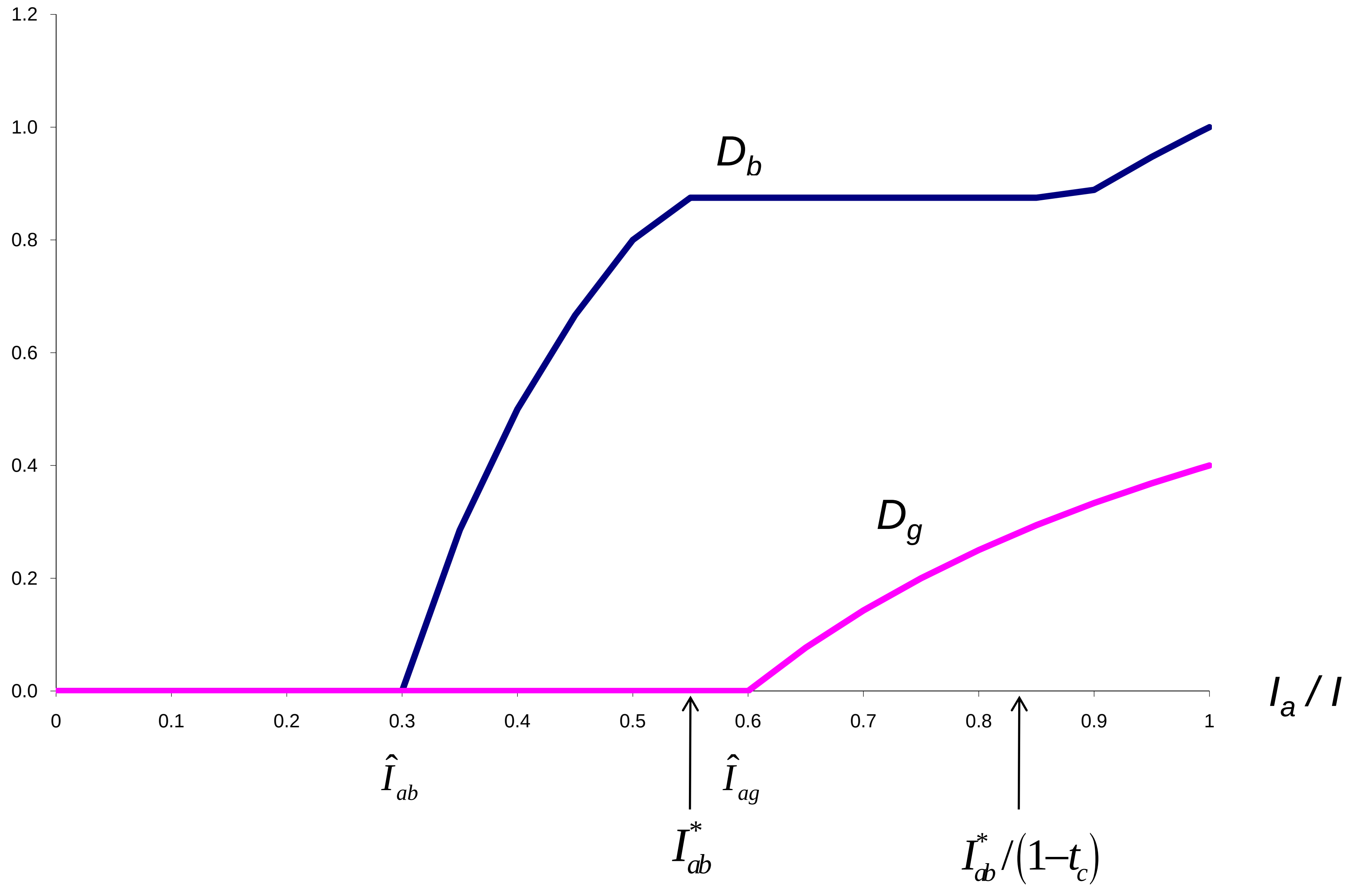

Figure 4
Individual donations

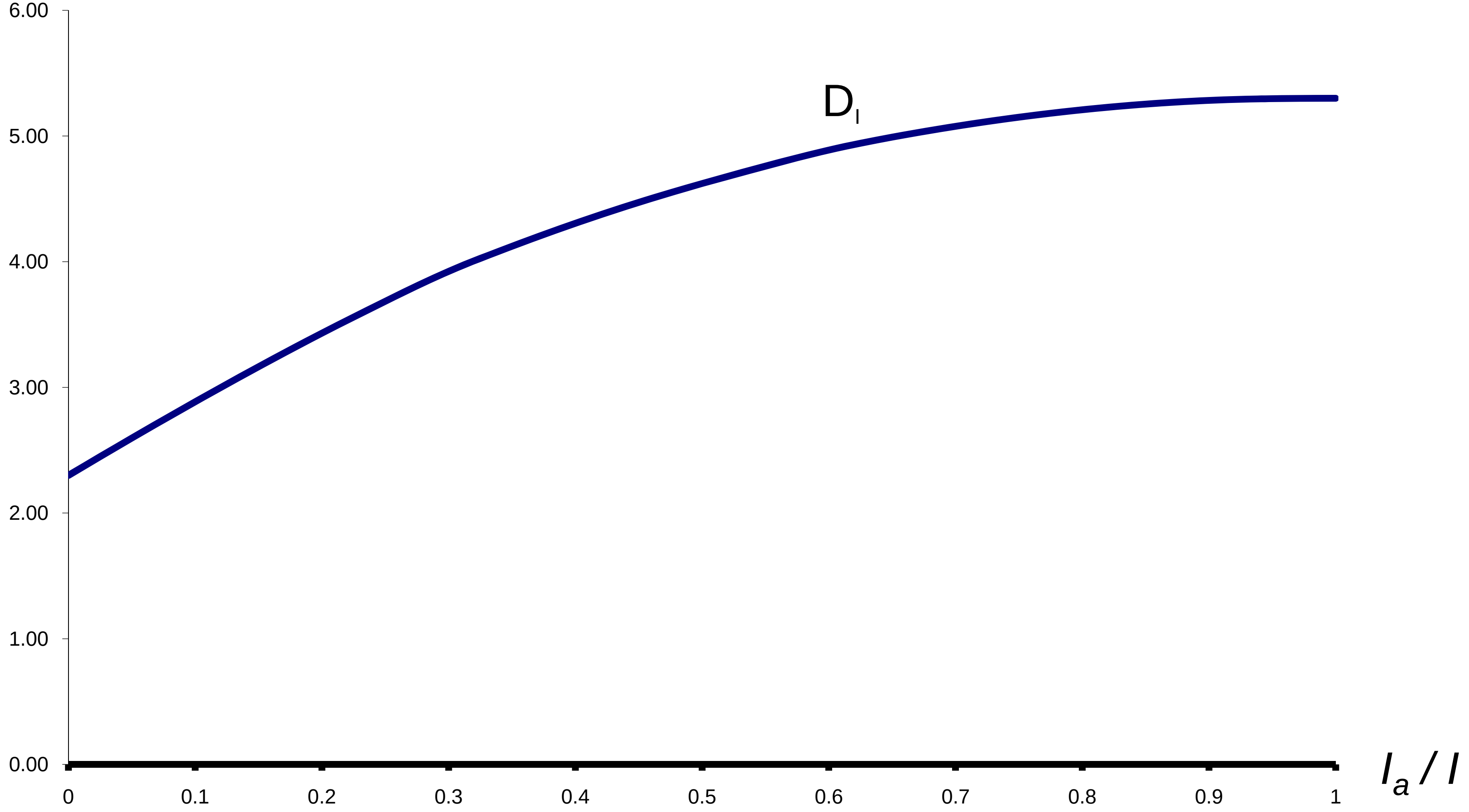

Figure 5
Social surplus (I_a/I=0.4)

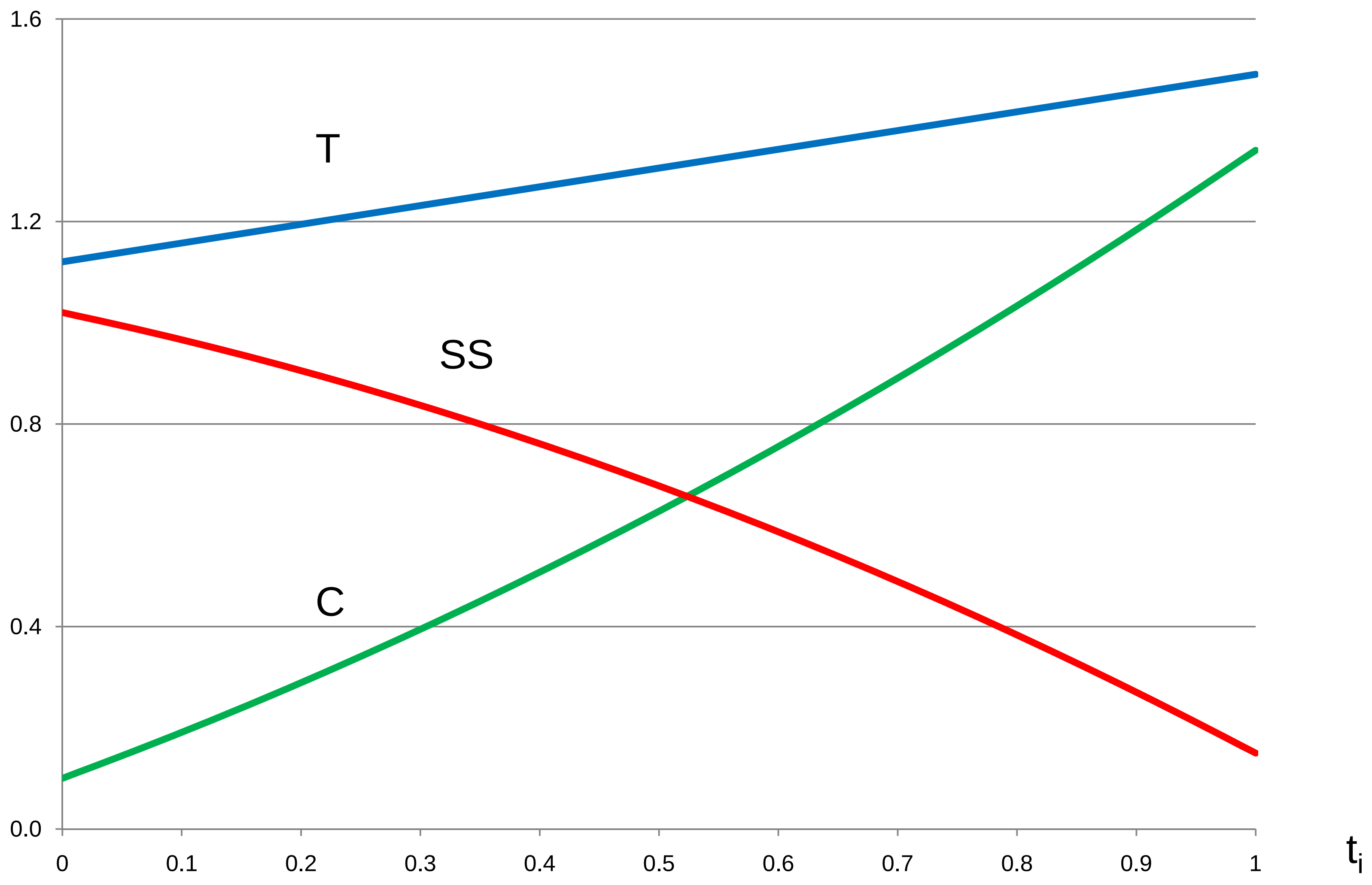

Figure 6

Social surplus (I_a/I=0.4)

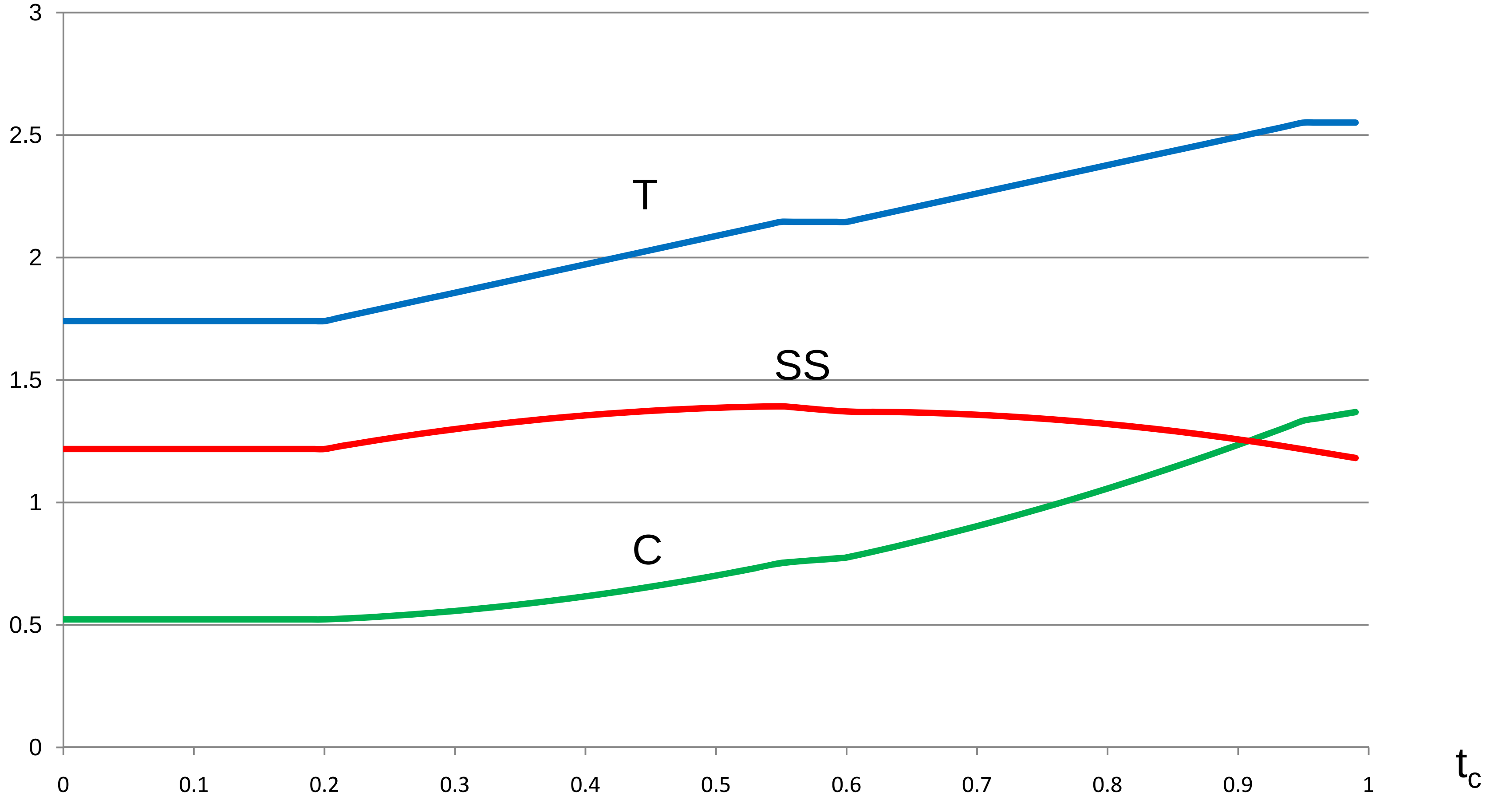

Figure 7

Social surplus (I_a/I=0.4)

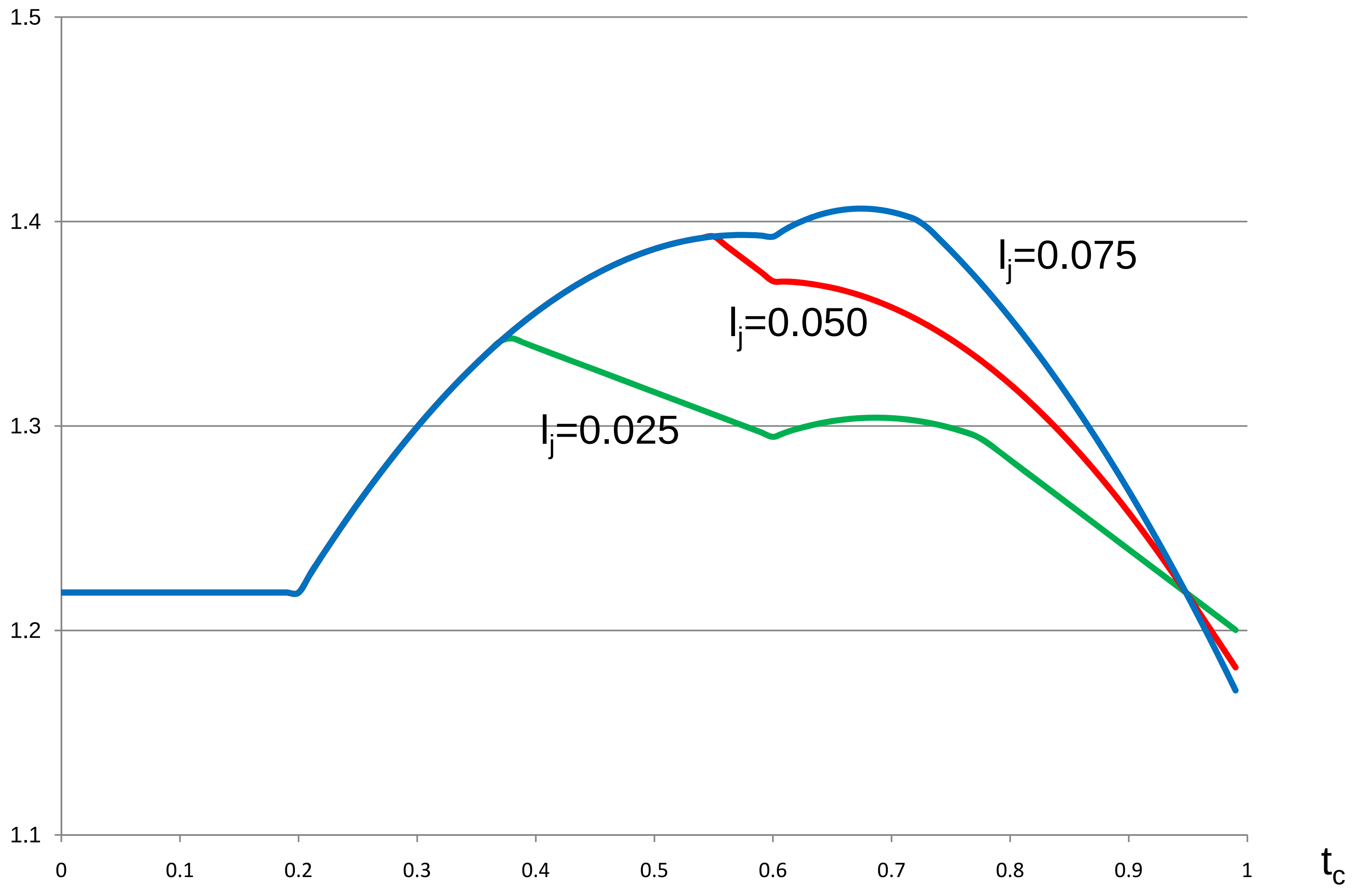

Figure 8

Effect of l_j on optimal t_c and resulting SS (I_a/I=0.4)