Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence

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Rui Albuquerque
Boston College, CEPR and ECGI

Yrjo Koskinen
University of Calgary

Chendi Zhang
University of Warwick

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Abstract

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Keywords: corporate social responsibility, product differentiation, systematic risk, beta, firm value, industry equilibrium

JEL Classifications: G12, G32, D43, L13, M14

Rui Albuquerque*
Associate Professor of Finance
Boston College, Carroll School of Management
140 Commonwealth Avenue
Chustnut Hill, MA 02467-3808, United States
e-mail: rui.albuquerque@bc.edu

Yrjo Koskinen
Associate Dean for Research
University of Calgary, Haskayne School of Business
2500 University Drive NW Calgary
Calgary AB T2N 1N4, Canada
phone: +1 403 220 5540
e-mail: yrjo.koskinen@ucalgary.ca

Chendi Zhang
Associate Professor of Finance
University of Warwick, Warwick Business School
Gibbet Hill Rd
Coventry, CV4 7AL, United Kingdom
e-mail: Chendi.Zhang@wbs.ac.uk

*Corresponding Author

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Abstract

This paper presents an industry equilibrium model where firms have a choice to engage in corporate social responsibility (CSR) activities. We model CSR as an investment to increase product differentiation that allows firms to benefit from higher profit margins. The model predicts that CSR decreases systematic risk and increases firm value and that these effects are stronger for firms with high product differentiation. We find supporting evidence for our predictions. We address a potential endogeneity problem by instrumenting CSR using data on the political affiliation of the firm's home state.

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1 Introduction

Corporate social responsibility (CSR) has long been a strategic concern for corporations around the world, responding to the interest shown by both consumers and investors.[1] Commenting on the significant pressure from stakeholders to adopt CSR policies the Economist concluded already in 2008 that "Company after company has been shaken into adopting a CSR policy: it is almost unthinkable today for a big global corporation to be without one". Arguably, CSR's increased popularity inside boardrooms has outpaced the research needed to justify it. Specifically, the mechanisms through which CSR may affect firm value are not fully understood. In this paper, we aim to close this gap and address the following questions: Does CSR affect systematic risk (as hypothesized by Bénabou and Tirole, 2010)? How is firm value affected? Is the effect of CSR on firm risk and value different across firms?

We develop an industry equilibrium model where firms choose to adopt a CSR or a non-CSR production technology and embed the choice of technology within a standard asset-pricing framework. Firms are heterogenous in their adoption cost of the CSR technology, so that firms with lower costs are more likely to do it. We model the adoption of CSR technology as a firm's investment to increase product differentiation. This interpretation is consistent with an extensive marketing and economics literature, which we discuss in the related literature section below. In the model, a CSR firm faces a relatively less price elastic demand, resulting in higher profit margins and product prices, ceteris paribus. Importantly, higher profit margins also lead to a lower elasticity of profits to aggregate shocks. From the perspective of a risk-averse investor, a firm exhibiting a lower elasticity of profits to aggregate shocks has lower systematic risk and has a higher firm value. However, higher

[1] The 2013 UN Global Compact-Accenture CEO Study on Sustainability of over 1000 CEOs listed brand, trust and reputation, together with consumers as their primary motivations to engage in CSR activities. Investors have also recognized the importance of CSR initiatives. Already in 1970 the landmark court decision Medical Committee for Human Rights vs. SEC opened the door for CSR proposals to be included in proxy statements (Glac, 2014). Starting in the 1990's the Global Reporting Initiative, later in partnership with the UN Environment Program and the OECD, has been offering corporations standardized reporting framework for their CSR activities.

profit margins lead more firms to adopt CSR policies and to pay higher costs. These higher adoption costs increase systematic risk and lower market value for the marginal firm. This industry-equilibrium feedback effect contrasts with the first, partial-equilibrium risk-reduction benefit of CSR.

We show that the relative strength of these two effects, and thus the relative riskiness of CSR firms, depends on consumers' expenditure share on CSR goods. A sufficiently small expenditure share on CSR goods limits the proportion of CSR firms and implies that the marginal CSR firm has lower systematic risk and higher valuation than non-CSR firms. Assuming small enough expenditure share on CSR goods, the two main model predictions are that CSR firms have lower systematic risk and higher firm value and that these effects are larger in firms with lower price elasticity of demand or greater product differentiation.

We test the model predictions using a comprehensive data set on firm-level CSR from MSCI's ESG Research database. The sample consists of a panel of U.S. firms from 2003 to 2015 with a total of 28,578 firm-year observations. We construct an overall CSR score that combines information on the firm's performance across community, diversity, employee relations, environment, product, and human rights attributes. We estimate firm systematic risk using the CAPM model as in our theory. Using the estimated betas as our dependent variable, we run panel regressions with time and industry fixed effects and with control variables that are known to affect systematic risk.

We first document that the level of systematic risk is statistically and economically significantly lower for firms with a higher CSR score. One standard deviation increase in firm CSR score is associated with a firm beta that is 1% lower relative to beta's sample mean. Next, we proxy product differentiation with advertising expenditures and find that the economic magnitude of the effect of CSR on firm beta is about 40% stronger for a firm with average level of advertising spending relative to a firm without advertising spending. We then analyze the effect of CSR on firm value, proxied by Tobin's Q. Consistent with the model, the association between Tobin's Q and CSR is positive and stronger for firms with greater product differentiation. We find that the economic magnitude of the effect of CSR on firm value is about 20% stronger for a firm with average level of advertising spending relative to a firm without advertising spending.

There are reasons to suspect that endogeneity may be an issue in our empirical specifications. A firm's financial resources may determine its CSR decisions (Hong, Kubik, and Scheinkman, 2012), or firms that differentiate their products through other means, such as branding, and thus have lower systematic risk, might also invest more in CSR. In order to address these concerns, we use a comprehensive set of control variables that includes cash and advertising expenses, in addition to time and industry fixed effects. In addition, we conduct an instrumental variables (IV) estimation taking as instrument the political affiliation of the state where the company's headquarters' are located following a literature that suggests that democratic-leaning voters care more about CSR (Gromet, Kunreuther, and Larrick, 2013, Costa and Kahn, 2013, Di Giuli and Kostovetsky, 2014). The IV regression results are consistent with our baseline panel data results.

Lastly, we also document that profits for firms with a high CSR score are less correlated with the business cycle than the profits for firms with a low CSR score. This finding provides supporting evidence for our main result that CSR leads to lower systematic risk.

Section 2 reviews the existing literature. Section 3 presents the model and Section 4 analyzes the equilibrium properties regarding risk and firm value. Section 5 presents the data and the results are in Section 6. Section 7 concludes. Proofs are in the appendix.

2 Related Literature

One of our main contributions is the development of a theory to study the relation between CSR and firm risk when firms respond to consumers' preferences and to put the analysis into an industry equilibrium framework. This paper belongs to a literature asserting that firms engage in profit-maximizing CSR (McWilliams and Siegel, 2001).[2] In particular, we draw from the research that argues that CSR is a product differentiation strategy (Navarro, 1988, Bagnoli and Watts, 2003, and Siegel and Vitalino, 2007). Consistent with this literature, Luo and Bhattacharya (2006, 2009) have argued that CSR increases customer loyalty, leading to firms having more pricing power. Direct evidence for this is observed in the ability of firms to sell more or at higher prices those products that have CSR features (see e.g. Creyer and Ross, 1997; Auger, Burke, Devinney, and Louviere, 2003; Pelsmacker, Driesen, and Rayp, 2005; Elfenbein and McManus, 2010; Elfenbein, Fisman, and McManus, 2012; Ailawadi, Luan, Neslin, and Taylor, 2014; Hilger, Hallstein, Stevens, and Villas-Boas, 2015). Flammer (2015a) provides indirect evidence for CSR as product differentiation strategy by showing that U.S. firms respond to tariff reductions that increase competition by increasing their CSR activities. In our empirical analysis, we use advertising expenditures as a proxy for product differentiation and show that our results are stronger when advertising expenditures are high. There is a long history in marketing and economics of thinking of advertising as a product differentiation strategy (see e.g. Bain, 1956). Comanor and Wilson (1979) conclude in the review of empirical evidence on advertising, that advertising has contributed to market power and thus enabled higher profit margins.

Our other main contribution is the empirical evaluation of the CSR-firm risk relation. While there is a recent empirical literature documenting a negative association between CSR and firm risk and cost of equity capital (e.g. El Ghoul, Guedhami, Kwok, and Misra, 2012, and Oikonomou, Brooks, and Pavelin, 2012), these papers do not claim a causal relation. We contribute to this literature by conducting an instrumental variables estimation and by presenting further evidence on the nature of the relation across firms as predicted by the model.

CSR has received scant attention in the theoretical finance literature. A notable ex-

[2] For a review, see Kitzmueller and Shimshack, 2012.

ception is Heinkel, Kraus, and Zechner (2001), who assume that some investors choose not to invest in non-CSR stocks. This market segmentation leads to higher expected returns and risk for non-CSR stocks, which must be held by only a fraction of the investors (as in Errunza and Losq, 1985, and Merton, 1987). Gollier and Pouget (2014) build a model where socially responsible investors can take over non-CSR companies and create value by turning those into CSR companies, but offer no prediction for firm systematic risk. These papers assume that a subset of investors have a preference for CSR stocks. As pointed out by Starks (2009), investors seem to care more about corporate governance than about CSR, and as noted above CEOs seem to care more about consumers when they make their CSR choices. We use the model to make predictions regarding the role of consumers in affecting the CSR-risk relation across industries and we test these predictions empirically. We are therefore able to provide evidence consistent with the main mechanism in the theory.

Our paper is also related to the work on intangible assets and firm risk. Belo, Lin, and Vitorino (2014) find that firms with higher investments in brand capital, measured by advertising expenditures, exhibit lower stock returns. Gourio and Rudanko (2014) provide a model with search frictions in the product markets where firms spend resources in acquiring customers. The acquired customer base becomes a valuable asset increasing firm value and profit margins. Eisfeldt and Papanikolaou (2013) argue that firms with talented employees (high organizational capital) are riskier, because key employees have a claim on cash flows that varies systematically. Larkin (2013) shows that firms with high brand perception have higher debt capacity, consistent with the view that brand value lowers firm risk. Lins, Servaes, and Tamayo (2017) show that firms with high social capital, measured as CSR rating, had considerably higher stock returns during the financial crisis, implying that CSR activities are a risk management tool.

There is a large empirical literature on the association between CSR and firm value. Margolis, Elfenbein, and Walsh (2010) review 35 years of evidence and show that there is on average a small positive effect. Servaes and Tamayo (2013) provide evidence that there is a positive relationship between CSR and firm value when customers have high awareness about firm activities. Servaes and Tamayo (2013) use advertising expenditures as a proxy for awareness, and their results are consistent with ours. Krüger (2015) finds a negative effect on stock prices if management is likely to receive private benefits from CSR adoption, but a positive effect if CSR policies are adopted to improve relations with stakeholders. Flammer (2015b) studies shareholder proposals for CSR that pass or fail with a small margin of votes and shows that approved proposals lead to positive abnormal stock returns. Dimson, Karakas, and Li (2015) find that institutional investor activism that leads to changes in firms' CSR policies are followed by positive abnormal stock returns, especially in industries that are likely to be consumer-oriented industries. Deng, Kang, and Low (2013) show that acquirers with high CSR scores experience higher merger announcement returns and better post-merger operating performance.

While the majority of recent studies has demonstrated economic benefits from CSR, Cheng, Hong, and Shue (2013) and Masulis and Reza (2014) provide evidence that an increase in effective managerial ownership leads to a decrease in CSR activities and corporate giving, consistent with the agency cost view of CSR. Both studies measure the marginal effect of changing after-tax ownership on CSR and thus do not show that on average CSR activities destroy value. Interestingly, Ferrell, Liang, and Renneboog (2016) show that well governed firms engage more in CSR activities, and that CSR activities are positively associated with executive pay-performance sensitivity. The evidence in Ferrell *et al.* (2016) is difficult to reconcile with the view that CSR is largely motivated by managers' personal benefits.

3 The Model

3.1 The model setup

Consider an economy with a representative investor and a continuum of firms with unit mass. There are two dates, 1 and 2.

Household sector: The representative investor has preferences

$$U(C_1, C_2) = \frac{C_1^{1-\gamma}}{1-\gamma} + \delta E\left[\frac{C_2^{1-\gamma}}{1-\gamma}\right]. \tag{1}$$

The relative risk aversion coefficient is $\gamma > 0$ and the parameter $\delta < 1$ is the rate of time preference. The expectations operator is denoted by $E[.]$. There are two types of goods in the economy. Low elasticity of substitution goods, which we associate with goods produced by socially responsible firms (CSR goods), and high elasticity of substitution goods, which we associate with other firms (non-CSR goods). We label these using the subscripts G and P, respectively, for green and polluting. A convenient analytical way to model differences in the elasticity of substitution across goods is to use the Dixit-Stiglitz aggregator,

$$C_2 = \left(\int_0^{\mu} c_i^{\sigma_G} di\right)^{\frac{\alpha}{\sigma_G}} \left(\int_{\mu}^{1} c_i^{\sigma_P} di\right)^{\frac{1-\alpha}{\sigma_P}}.$$

Accordingly, $0 < \sigma_j < 1$ is the elasticity of substitution within c_j, $j = G, P$ goods. A lower elasticity of substitution implies lower price elasticity of demand and a more "loyal" demand. We therefore are interested in the case $\sigma_G < \sigma_P$.[3] The parameter α is the share of expenditures allocated to CSR goods and is exogenous. In the context of our representative agent model, α captures the market size for CSR goods.[4] The variable μ measures the fraction of CSR firms and is determined in equilibrium.

[3] Gourio and Rudanko (2014) provide microfoundations for our reduced-form way of assuming lower price elasticity of demand for CSR goods. In Gourio and Rudanko search frictions in the goods markets create long-term customer relationships that are slow to adjust, i.e. customer loyalty.

[4] We view α as capturing the expenditure that comes from consumers that actively seek out CSR goods independently of their income. High income consumers may have a higher demand for CSR goods, but if CSR is viewed by them as a luxury, then their demand for CSR would be strongly procylical even if in general their overall demand for goods is less sensitive to the business cycle.

Investor optimization is subject to two budget constraints. At date 1, the investor is endowed with stocks and with cash $W_1 > 0$ expressed in units of the aggregate good. The investor decides on the date 1 consumption, C_1, stock holdings, D_i, and the total amount of lending to firms, B, subject to the date 1 budget constraint,

$$\int_0^1 Q_i di + W_1 \geq C_1 + \int_0^1 Q_i D_i di + B, \tag{2}$$

and given the stock prices Q_i and the interest rate r.

The investor decides on the date 2 consumption, c_i, subject to the budget constraint:

$$W_2 \equiv \int D_i \left(\pi_i - F_i\right) di + wL + B\left(1+r\right) \geq \int p_i c_i di. \tag{3}$$

In the budget constraint, π_i is the operating profit generated by firm i and F_i is a cash outlay to be specified later so that $\pi_i - F_i$ is the net profit, and in this static model it is also the liquidation payoff. W_2 denotes the consumer's wealth at the beginning of date 2, w is the wage rate, L is the amount of labor inelastically supplied and p_i is the price of good i. The investor behaves competitively and takes prices as given.

Production sector: At date 1, firms choose which production technology to invest in. The decision is based on expected operating profitability and fixed adoption costs. Each firm is endowed with a technology-adoption cost. Firm i faces a cost of τ_{Gi} if it chooses to invest in the CSR technology or a cost $\tau_P > 0$ if it chooses the non-CSR technology. The distribution of costs τ_{Gi} across firms is a uniform that takes values between 0 and 1. Firm i finances τ_i by raising debt B_i and therefore has zero cash flow at date 1.[5]

Date-2 operating profits depend on the price elasticity of demand. We interpret choosing the G technology as a product differentiation strategy, because $\sigma_G < \sigma_P$ implies that G firms

[5] Instead of assuming an adoption cost, an equivalent formalization of the choice that firms face is to assume that there is an idiosyncratic disaster shock at date 2 that reduces $\tau\left(1+r\right)$ of the profits of non-CSR firms with probability ω after trading has occurred. With probability $1-\omega$ no disaster occurs. The expected disaster loss is denoted by $\tau_P = \omega\tau$ in units of date 1 consumption. To avoid this uncertainty, a firm can adopt the G technology at a cost τ_{Gi} paid at date 1.

have more pricing power, *ceteris paribus.* Note that a higher cost τ_{Gi} does not translate into a higher benefit for CSR firms. Instead, all CSR firms have access to the same elasticity of substitution, σ_G. This assumption captures the idea that CSR adoption is not equally costly to all firms.

At date 2, firm $i = G, P$ chooses how much to produce of its good, x_i, in order to maximize operating profits. Firms act as monopolistic competitors solving:

$$\pi_i = \max_{x_i} \{p_i(x_i)\, x_i - wl_i\}, \tag{4}$$

subject to the equilibrium inverse demand function $p_i(x_i)$ as well as the constant returns to scale production technology,

$$l_i = Ax_i. \tag{5}$$

Production of one unit of output requires A units of labor input.[6] The aggregate productivity shock, A, is realized at date 2 before production takes place. The productivity shock changes the number of labor units needed to produce consumption goods and thus high productivity is characterized by low values of A. The shock A is assumed to have bounded support in the positive real numbers.

Net profits for a non-CSR firm are $\pi_P - \tau_P(1+r)$, whereas net profits for a CSR firm are $\pi_G - \tau_{Gi}(1+r)$, assuming that CSR firms finance the adoption cost at date 1 by raising debt B_i and therefore have zero cash flow at date 1.

Market clearing: At date 1, asset markets clear, $D_i = 1$, for all i, and $B = \int_0^1 B_i di$. At date 2, goods markets clear, $x_i = c_i$, for all i, and the labor market clears, $\int_0^1 l_i di = L$.

3.2 Equilibrium

We start by solving the equilibrium at date 2.

[6] We have solved the model with the more general production function $l_i = A^{\eta_i}\kappa_i x_i$, allowing for firm-level heterogeneity in the sensitivity to aggregate shocks and in the unit cost of labor. We obtain the same results regarding CSR and systematic risk.

Date-2 equilibrium: Let $\mu \in (0,1)$ denote the fraction of CSR firms determined in date 1. The outcome of the date-2 equilibrium is given as a function of μ. The appendix shows that the demand functions for CSR goods and non-CSR goods are, respectively,

$$c_l = \alpha \frac{p_l^{\frac{1}{\sigma_G - 1}}}{\int_0^\mu p_i^{\frac{\sigma_G}{\sigma_G - 1}} di} W_2, \tag{6}$$

$$c_k = (1-\alpha) \frac{p_k^{\frac{1}{\sigma_P - 1}}}{\int_\mu^1 p_i^{\frac{\sigma_P}{\sigma_P - 1}} di} W_2, \tag{7}$$

Firm l's demand elasticity equals $-\frac{1}{1-\sigma_l}$. Thus, a lower elasticity of substitution (lower σ_l) is associated with a demand that is less sensitive to price fluctuations and is therefore more loyal.

Firms act as a monopolistic competitors and choose x_i according to equation (4) subject to the inverse demand functions $p_i(x_i)$ derived from (6) or (7). The first order conditions are:

$$\sigma_G p_l = wA, \qquad \sigma_P p_k = wA.$$

The second order condition for each firm is met because $0 < \sigma_j < 1$. Using these first order conditions, we get the optimal value of operating profits,

$$\pi_j = (1-\sigma_j) p_j x_j. \tag{8}$$

Goods with lower elasticity of substitution σ_j, *i.e.* goods with more loyal demand, allow producers to extract higher profits per unit of revenue, all else equal. It is possible to construct models where increases in demand shift the profit margin (for example with Cournot oligopoly), but in our model the profit margin is directly tied to the elasticity of substitution and hence to CSR.

To solve for the equilibrium, Walras' law requires that a price normalization be imposed. We impose that the price of the aggregate consumption good is time invariant, so its price at date 2 equals the price at date 1, which is 1. This normalization imposes an implicit constraint on prices p_l, $1 = \min_{c_i \in \{c_i : C_2 = 1\}} \int_0^1 p_i c_i di$. The price normalization implies that $W_2 = \int p_l c_l dl = C_2$, from which we obtain the usual condition that the marginal utility of date-2 wealth with constant relative risk aversion preferences equals $C_2^{-\gamma}$. The next proposition describes the date-2 equilibrium as a function of μ. The proof is in the Appendix.

Proposition 1 *For any interior value of μ and any aggregate shock A, a symmetric date-2 equilibrium exists and is unique with goods prices, $p_P = \bar{p}$,*

$$p_G = \bar{p} \frac{\sigma_P}{\sigma_G},$$

consumption,

$$\begin{aligned} c_G &= \frac{\sigma_G}{\sigma_P} \bar{x} \frac{\alpha}{\mu} A^{-1}, \\ c_P &= \bar{x} \frac{1-\alpha}{1-\mu} A^{-1}, \end{aligned}$$

wage rate, $w = \bar{p} A^{-1} \sigma_P$, operating profits,

$$\begin{aligned} \pi_G &= \bar{p}\bar{x} \left(1 - \sigma_G\right) \frac{\alpha}{\mu} A^{-1}, \\ \pi_P &= \bar{p}\bar{x} \left(1 - \sigma_P\right) \frac{1-\alpha}{1-\mu} A^{-1}, \end{aligned}$$

and marginal utility of wealth, $\lambda = [\bar{p}\bar{x}]^{-\gamma} A^{\gamma}$, where $\bar{p}, \bar{x} > 0$ are functions of exogenous parameters given in the Appendix.

In equilibrium, a higher productivity shock (lower A) increases the demand for labor and thus also increases the wage rate. Prices are constant with respect to the aggregate shock and there is a CSR-price premium, $p_G > p_P$, because $\sigma_G < \sigma_P$.

Date-1 equilibrium: To solve for the date-1 equilibrium, we need to determine the rate used by the representative investor to discount future profits. Imposing the equilibrium conditions, the date-1 budget constraint gives $C_1 = W_1 - B$, so that the intertemporal marginal rate of substitution, or stochastic discount factor, becomes:

$$m \equiv \delta \left(\frac{C_2}{C_1} \right)^{-\gamma} = \bar{m} \left[\bar{p}\bar{x} \right]^{-\gamma} A^{\gamma}, \tag{9}$$

where $\bar{m} = \delta \left(W_1 - B \right)^{\gamma}$. States of the world with low productivity (high A), and therefore low consumption, have higher marginal utility of consumption and higher m.

The date-1 equilibrium has the familiar pricing conditions for bonds,

$$1 = E \left[m \left(1 + r \right) \right], \tag{10}$$

and for stocks,

$$Q_i = E \left[m \pi_i \right] - \tau_i. \tag{11}$$

Firms choice problem is to solve $\max \{ Q_G, Q_P \}$. In equilibrium, if there is an interior solution for μ, then $Q_j \geq 0$ and the price of the marginal CSR firm, Q_G^*, has to equal the price of the non-CSR firm, $Q_P = Q_G^*$. This equality determines the cut-off cost τ_G^* at which the marginal firm is indifferent between investing or not investing in CSR:

$$E \left[m \pi_G \right] - \tau_G^* = E \left[m \pi_P \right] - \tau_P. \tag{12}$$

At an interior solution for μ, infra-marginal CSR firms, with $\tau_{Gi} < \tau_G^*$, have stock prices higher than Q_G^*, because π_G is equal for all CSR firms. At a corner solution with $\mu = 1$, $Q_P \leq Q_G$, for all τ_G. At a corner solution with $\mu = 0$, $Q_P \geq Q_G$, for all τ_G. Given an equilibrium threshold level τ_G^*, the equilibrium mass of CSR firms is $\mu = \int_0^{\tau_G^*} di = \tau_G^*$.

It is immediate then that firm-level CSR is associated with higher firm value. In equilibrium $Q_P = Q_G^*$, so that firm values are equal for the marginal CSR firm and all non-CSR firms. Because the value of the marginal CSR firm is $Q_G^* = E \left(m \pi_G \right) - \tau_G^*$ and infra-marginal CSR firms have lower costs of adopting the CSR technology, the net benefits of CSR adoption are higher for those firms. Thus firm values have to be higher for the infra-marginal firms, *i.e.* $Q_{Gi} = E \left(m \pi_G \right) - \tau_{Gi} \geq Q_G^* = Q_P$. We test this prediction below.

We are unable to show analytically existence of date-1 equilibrium for μ.[7] The next proposition offers a characterization of the solution when an equilibrium exists and states that the proportion of CSR firms is related to the expenditure share on CSR goods.

Proposition 2 *At an interior equilibrium for μ, the proportion of CSR firms in the industry is $\mu < \tau_P$ iff $\alpha < \bar{\alpha}$, where*

$$\bar{\alpha} = \frac{(1-\sigma_P)\,\tau_P}{1-\sigma_G-\tau_P\,(\sigma_P-\sigma_G)}.$$

Moreover, the constant $\bar{\alpha}$ is increasing in σ_G and $\bar{\alpha} < \tau_P$ iff $\sigma_P > \sigma_G$.

The constant $\bar{\alpha}$ is the expenditure share at which $\mu = \tau_P$. Any expenditure share $\alpha < \bar{\alpha}$ leads to a proportion $\mu < \tau_P$. A more loyal demand for CSR firms, $\sigma_P > \sigma_G$, implies that the threshold expenditure share $\bar{\alpha} < \tau_P$. Intuitively, if $\sigma_P > \sigma_G$, then CSR firms are able to extract higher rents for the same expenditure share α and the proportion of CSR firms grows. To place an upper bound on μ, a sufficiently smaller expenditure share α is required.

4 CSR and Risk in Equilibrium

In this section, we analyze the properties of CSR firms' risk. For simplicity, we use the notation $\alpha_j = \alpha$ if $j = G$, and $\alpha_j = 1-\alpha$ if $j = P$. Likewise, $\mu_j = \mu$ if $j = G$, and $\mu_j = 1-\mu$ if $j = P$.

4.1 Profitability and aggregate shocks

We start by describing the properties of date 2 net profits in response to aggregate shocks. Consider the elasticity of net profits to the aggregate shock for a generic firm j,

$$\frac{d\ln\left(\pi_j-\tau_j\,(1+r)\right)}{d\ln A^{-1}} = \frac{\bar{\eta}\bar{p}\bar{x}\,(1-\sigma_j)\,\frac{\alpha_j}{\mu_j}A^{-1}}{\bar{p}\bar{x}\,(1-\sigma_j)\,\frac{\alpha_j}{\mu_j}A^{-1}-\tau_j\,(1+r)}.$$

We compute the elasticity with respect to A^{-1} so that the elasticity is positive (recall that a high value of A^{-1} corresponds to an economic upturn.) The sensitivity of firms' profits

[7] We have verified numerical existence of an interior solution for μ.

to aggregate shocks depends on the price elasticity of demand. To see this, consider the partial equilibrium effect that lower σ_j has on the sensitivity of profits to aggregate shocks holding μ constant. The partial derivative with respect to σ_j is positive, implying that a firm facing a lower price elasticity of demand has profits that are less sensitive to aggregate shocks. The intuition for the result is that more product differentiation generates greater profit margins for the firm, which dilute the effect of the technology adoption costs. This partial equilibrium result captures the widely held view that a less price elastic demand gives the firm the ability to smooth out aggregate fluctuations better. Similarly, profits are more sensitive to aggregate shocks when the costs τ_j are high.

The next proposition extends this partial equilibrium result by considering the equilibrium implications of productivity shocks on the net profits of CSR and non-CSR firms.

Proposition 3 *Define the ratio of net profits evaluated at the marginal CSR firm:*

$$R_\pi \equiv \frac{\pi_G - \tau_G^* (1+r)}{\pi_P - \tau_P (1+r)}.$$

$R_\pi > 1$ *and is increasing with* A *iff* $\alpha < \bar{\alpha}$. *Also,* $\pi_G < \pi_P$ *if and only if* $\alpha < \bar{\alpha}$.

For a sufficiently small expenditure share in CSR, $\alpha < \bar{\alpha}$, *i.e.* for $\mu < \tau_P$, firms that choose the CSR technology have profits that are less sensitive to productivity shocks than those of non-CSR firms. That is, net profits of CSR firms relative to the profits of non-CSR firms are countercyclical. This result is supported by the evidence in Lins, Servaes, and Tamayo (2017) showing that CSR firms experienced higher profitability than non-CSR firms during the financial crisis (see also Cornett, Erhemjamts and Tehranian, 2016). It is interesting to contrast this result with the prediction from the alternative view that CSR goods are superior goods. Under this alternative view, CSR firms are *riskier* because their profits co-move *more* with the business cycle, when income is high, than non-CSR firms' profits.

The model also predicts that operating profits of CSR firms are lower than operating profits of non-CSR firms, *i.e.* $\pi_G < \pi_P$ if and only if $\alpha < \bar{\alpha}$, consistent with the evidence in Di Giuli and Kostovetsky (2014). It is important to note that while operating profits are lower for CSR firms, net profits are larger, *i.e.* $\pi_G - \tau_G (1+r) > \pi_P - \tau_P (1+r)$, when $\alpha < \bar{\alpha}$.

4.2 CSR and systematic risk

To see how the results on profits translate to systematic risk, define the gross return to firm j as the ratio of its net profits to its stock price, $1 + r_j \equiv (\pi_j - \tau_j (1+r)) / Q_j$. Also, define the value-weighted market return as $1 + r_M \equiv \int \omega_i (1 + r_i) \, di$, with $\omega_i \equiv Q_i / \int Q_j dj$. In our empirical tests, we measure systematic risk with respect to the market return.

Proposition 4 *Consider firm j's market $\beta_j = Cov(r_j, r_M) / Var(r_M)$. We have,*

$$\beta_j = \frac{(1-\sigma_j)\,\alpha_j}{(1-\sigma_G)\,\alpha + (1-\sigma_P)(1-\alpha)} \frac{1}{\mu_j \omega_j}.$$

At an interior solution for μ, $\beta_P > \beta_G^*$ iff $\bar{\alpha} > \alpha$. Keeping μ constant, β_j increases with σ_j.

This proposition compares the *level* of systematic risk between CSR and non-CSR firms. Consider an equilibrium where the fraction of CSR firms is not too large, *i.e.* $\mu \leq \tau_P$ (or $\alpha \leq \bar{\alpha}$). In such an equilibrium, the marginal CSR firm has lower β than a non-CSR firm. In addition, because $Q_j \geq Q_G^*$ for any infra-marginal CSR firm j, then $\beta_j \leq \beta_G^*$. Therefore, if $\mu \leq \tau_P$, then the average CSR firm has lower market β than the average non-CSR firm. Now consider an equilibrium where the fraction of CSR firms is sufficiently large, *i.e.* $\mu > \tau_P$. When $\mu > \tau_P$ (or $\alpha > \bar{\alpha}$), the marginal CSR firm has higher market β than non-CSR firms. The reason is that when the proportion of CSR firms is larger, the marginal CSR firm has high technology adoption costs and high profit sensitivity to aggregate shocks. Hence, high systematic risk. Moreover, lower values of σ_j, lead to lower β_j.[8]

We test this prediction by regressing firm-level systematic risk on the firm's CSR attributes, controlling for known determinants of systematic risk. In addition, we interact CSR with advertising expenditures to test the prediction that CSR-firm betas are lower when there is greater product differentiation. Our model predictions and tests are thus complementary to the hypothesis studied in Servaes and Tamayo (2013) stating that CSR has a positive impact on firm value when customer awareness is high. We argue that the link they find of CSR and firm value is at least partly explained via the level of systematic risk.

While our model predictions build on lower price elasticity of demand, we do not differentiate between consumer industries and business-to-business industries in testing our model (other than controlling for industry fixed effects) because consumers are aware of firms' supply chains, which creates an incentive for firms in other industries to also engage in CSR. That is, consumers demand better CSR policies from the firms they buy from and from the firms that supply to these firms. For example, according to Fortune magazine ("Apple does a 180 with suppliers in China", June 7, 2013), Apple has become one of the most proactive IT-companies in China demanding higher environmental standards from its key suppliers.

5 Data Description

Our firm-level CSR data is from the MSCI's ESG Research database, formerly known as KLD Research & Analytics, and ranges from 2003 to 2015.[9] The ratings aim to capture

[8] Using equations (10) and (11), the usual pricing condition in a consumption-CAPM obtains, which allow us to state expected excess returns as a function of $Cov(m, \pi_j)$. The appendix shows that at an interior solution for μ, the marginal CSR firm has $E(r_P - r) > E(r_G^* - r)$ iff $\bar{\alpha} > \alpha$. Expected excess returns increase with σ_G as well.

[9] MSCI ESG's data coverage prior to 2003 is limited. It covers about 1,100 firms in 2001 and 2002, and 650 firms from 1991 to 2000.

social, environmental and corporate governance factors that are relevant to a firm's financial performance and its risk management. Firms are rated on a variety of strengths and concerns on seven attributes: community, diversity, employee relations, environment, product, human rights, and governance. We exclude corporate governance attributes from our analysis to focus on non-governance aspects of CSR.

We measure CSR as the difference between the number of strengths and that of concerns for each firm-year. Given that the number of individual concerns and strengths in each attribute changes over time, we construct two normalized measures of CSR to ensure comparability.[10] First, we divide both the number of strengths and the number of concerns across all six CSR attributes for each firm-year by the sum of all maximum possible number of strengths and concerns across the six attributes for each firm-year. We then subtract the scaled concerns from the scaled strengths to obtain *CSR1*. Second, following Deng *et al.* (2013) and Servaes and Tamayo (2013), we divide the number of strengths (concerns) for each firm-year across all six CSR categories by the maximum possible number of strengths (concerns) in all six categories for each firm-year. We then subtract the scaled concerns from the scaled strengths to obtain *CSR2*. In summary, *CSR1* and *CSR2* are both bounded between -1 and 1, but while the first imposes a common scale factor to normalize strengths and concerns, the second allows for different scale factors for strengths and concerns. In both cases, scaling alleviates the concern of a changing number of strengths and concerns over time and across firms.

We match social responsibility data with Compustat using CUSIPs as firm identifiers. We manually check stock ticker and company name for accuracy. We match these data with stock return data from CRSP in order to obtain an estimate of systematic risk. To

[10] KLD and then MSCI ESG Research changed the rating methodology over time. One of the main changes occurred in 2010 when MSCI took over KLD. Over time, too, the number of concerns and strengths in some categories has changed. For example, the maximum possible number of strengths (concerns) for Microsoft was 32 (27) in 2003, changed in 2006, 2010, 2012, 2013, and are 36 (25) in 2014.

construct an estimate of systematic risk that proxies our model's main variable, we use the CAPM model and run the following time-series regression for every stock i in year t using daily data

$$r_{i,s} - r_s = h_i + \beta_i \left(r_{M,s} - r_s \right) + \varepsilon_{i,s}. \tag{13}$$

$r_{i,s}$ is the return for stock i in day s, r_s is the one-month T-Bill rate in day s transformed into a daily rate, and $r_{M,s}$ is the return on the CRSP value-weighted index in day s. The value of systematic risk for stock i at year t is taken to be the estimated value of β_i.

After matching all databases, our sample has 28,578 firm-year observations from 4,670 distinct companies. The data contain between 1,858 and 2,791 publicly listed U.S. companies each year. Table A.I in the Appendix provides a detailed description of the variables used in the analysis including all control variables. Summary statistics are in Panel A of Table 1. All firm variables (except for the two CSR measures and diversification) are winsorized at the 1% and 99% levels. Panel B of Table 1 ranks the Fama-French 12 industries according to both of our CSR measures. Perhaps not surprisingly, Consumer Non-Durables ranks very highly across both CSR measures, together with Business Equipment and Finance. At the other end, Chemicals and Energy rank the lowest.

[Insert Table 1 here]

6 Empirical Results

6.1 Empirical Strategy

To explain variation in firm β due to CSR, we control for other variables known to be associated with firm systematic risk. Leverage (long term debt to assets), size (log of assets), and earnings variability have been shown to affect systematic risk (e.g., Beaver, Kettler, and Scholes, 1970). McAlister, Srinivasan, and Kim (2007) show that R&D expenditures has an impact on systematic risk. Melicher and Rush (1973) show that conglomerate firms have higher βs than stand-alone firms. Palazzo (2012) shows that firms with higher levels of cash holdings display higher systematic risk. Novy-Marx (2011) shows that operating leverage predicts cross-sectional returns. In addition, we control for advertising expenditures, CAPEX and state corporate tax rate. All independent variables are lagged by one year. We also include industry fixed effects (based on Fama-French 12 industries) to reflect the industry equilibrium of our model and year fixed effects. In all tests, the standard errors are two-way clustered by firm and year to adjust for arbitrary heteroskedasticity, cross-sectional and time-series correlation (see Petersen, 2009). Of the various controls, we highlight the inclusion of *Advertising* that also may be a part of product differentiation strategy. If product differentiation originated only through advertising, then we would not expect CSR to be related to risk. Likewise, if product differentiation arose because of the firm's technology (e.g., Apple or Microsoft), then controlling for *R&D*, and *CAPEX* should help capture this additional channel.

6.2 CSR and Risk

We first examine how CSR is related to firm systematic risk. Table 2 reports the results using panel regressions. Specifications 1 and 2 report the results controlling for industry and year fixed effects, but without firm controls. The specifications show that the level of systematic risk is lower for firms with higher CSR scores, with a coefficient that is statistically significant at the 1% level. In specifications 3 and 4, we include firm controls in the regression model. The coefficients on the two measures of CSR remain statistically significant. In terms of economic significance, a one-standard-deviation increase in *CSR1* (*CSR2*) reduces β by 0.014 (0.010), which is a 1% (1%) decrease relative to the average firm beta of 1.228 (from Table 1). The control variables display the expected signs: *R&D*, *Leverage*, *Cash*, and *Earnings variability* are positively related to systematic risk, whereas *Advertising* and *Size* are associated with lower systematic risk. The other controls, including

Operating leverage, *CAPEX*, *Diversification,* and *State tax* are not statistically significant across specifications.

[Insert Table 2 here]

To test our main prediction of whether firm-level CSR is more negatively related with firm systematic risk in firms with greater product differentiation, we interact firm CSR with the *Advertising* variable (specifications 5 and 6 of Table 2). In both specifications, the coefficients on the interaction terms have the predicted signs and are statistically significant at the 5% level or better. For a firm with average advertising expenditure of 0.01 (see Table 1), the absolute value of the coefficient of CSR on firm risk is larger by 0.098 (0.049) for *CSR1* (*CSR2*) than that of a zero-advertising firm. This is a significant increase in economic magnitude by 43% (71%) from the absolute value of the coefficient of 0.227 (0.070) for *CSR1* (*CSR2*) for a zero-advertising firm.[11]

6.3 Endogeneity in the CSR-Risk Relation

One concern with our analysis, and in fact with most other studies of CSR, is that of endogeneity. Consider the following mechanism for reverse causality in the CSR-risk relation. Hong *et al.* (2012) present evidence suggestive that financially constrained firms are less likely to spend resources on CSR and that when these firms' financial constraints are relaxed spending on CSR increases consistent with the slack hypothesis of Waddock and Graves (1997).[12] Extending the slack hypothesis, it may be that firms with low levels of systematic risk have higher valuations and more resources to spend in CSR, or have fewer

[11]The advertising data in Compustat has many missing observations, which we set to zero following the literature. Unfortunately, these missing observations do not mean that the firms did not advertise, but rather that firms did not report the item separately from SG&A (Selling, General and Administrative Expenses). This data deficiency is likely to produce an attenuating bias against our findings. If the no advertising firms indeed advertise, then it should be more difficult to detect any differences between the two groups, yet the differences persist.

[12]Note, however, that causation may go the other way around: Cheng, Ioannou, and Serafeim (2014) provide evidence that CSR activities improve access to finance and thus relax financing constraints.

growth options and again more resources to dedicate to CSR. Another mechanism for reverse causality occurs if firms that traditionally build customer loyalty through advertising, and thus have lower systematic risk, also invest more in CSR. Finally, firms with low level of systematic risk or higher valuation may be in industries that are more prone to developing more intensive CSR policies.

To alleviate these concerns, we proceed in two ways. First, we control for a long list of (lagged) variables that capture some of the above mentioned effects. For example, when we control for *Cash*, *CAPEX* and *R&D* we partially control for the slack hypothesis. When we control for *Advertising* and *R&D*, we control for the other types of investment in customer loyalty. Industry fixed effects capture unobserved industry characteristics that can be correlated with the error term and result in endogeneity.

Second, we deal with endogeneity by instrumenting for CSR. The instrument we use builds on a literature that argues that democratic-leaning voters tend to care more about CSR issues. The instrument we use is the political affiliation of the state where the company is headquartered. Di Giuli and Kostovetsky (2014) find that firms headquartered in Democratic party-leaning states are more likely to spend resources on CSR. Gromet *et al.* (2013) demonstrate that more politically conservative individuals are less in favor of investment in energy efficient technology than are those who are more politically liberal (see also Costa and Kahn, 2013). When the electorate is more Democratic, companies may be more susceptible to pressure from activists to adopt CSR policies (for activist pressure and CSR, see Baron, 2001).[13] Specifically, we use the following variables to instrument for CSR: *President vote, democrats* is the proportion of votes in each state received by the Democratic candidate for president; *Congress, democrat* captures House and Senate Democratic representation from each state; and *State government, democrats* captures state chambers'

[13] Cornett, Erhemjamts, and Tehranian (2015) provide evidence that firms respond to activist and political pressure. Cornett et al. show that commercial banks adopted CSR policies in the aftermath of the financial crisis as a response to the criticism of being socially irresponsible prior to the crisis.

representation by Democrats (see Appendix A.I for details). We include industry fixed-effects in all our regressions, so that the explanatory variation for our regressions comes from states becoming more or less Democratic over time. Given that year fixed effects may absorb excessively the time-variation in our political instruments, we report results both with and without year fixed effects.[14]

Table 3 reports the results of the IV estimation. Columns 1 to 4 present results with industry and year fixed effects. In the first stage regressions reported in columns 1 and 3, we regress firm CSR on the instruments and all the control variables with industry and year fixed effects. As expected, firms headquartered in more Democratic-leaning states have higher CSR scores with the first and the second instruments being statistically significantly positive. The third instrument is statistically significantly negative due to its correlation with the other instruments, but note that it would display a positive coefficient if it were used without the other two instruments. [15] In the second stage regressions reported in columns 2 and 4, we use the fitted values of CSR, and its interaction with advertising expenditure, as independent regressors to explain firm systematic risk. In both specifications, the coefficients on the interaction terms have the predicted signs and are statistically significant. For a firm with average advertising expenditure, the absolute value of the coefficient of CSR on firm risk is larger by 0.205 (0.091) for *CSR1* (*CSR2*) than that of a zero-advertising firm. This is a significant increase in economic magnitude by 29% (22%) from the absolute value of the coefficient of 0.706 (0.419) for *CSR1* (*CSR2*) for a zero-advertising firm. Results are similar without year fixed effects (see columns 5 to 8). In both specifications, the coefficients on the interaction terms are statistically significant at the 1% level.

[14] It can be argued that firms may change their headquarter location in response to changes in a state's political attitude. In our sample, less than 1% of firm-year observations come from companies that changed the location of their headquarters between 1990 and 2005, based on Compustat's data for the location of firms' headquarters. In the instrumental variables analysis we exclude companies that changed headquarter state during the prior 25 years.

[15] The results are not significantly affected if the third instrument is removed.

[Insert Table 3 here]

We run two specification tests. First, we run a weak instruments test allowing for clustered errors. The first-stage regression of CSR on the political instruments and other exogenous variables produces a Kleibergen-Paap rank Wald F-statistic of joint significance of the excluded instruments of 20.380 (19.341) for column 1 (3), indicating that the excluded, political instruments are relevant (and similarly for the other specifications). Second, we run Hansen's test of overidentifying restrictions that tests for the exogeneity of the instruments while allowing for clustered errors. We cannot calculate the Hansen's J statistic for specifications with time and industry fixed effects. For the specifications without time fixed effects, Hansen's J statistic is 1.307 (1.293) for instrumenting *CSR1 (CSR2)* , which is statistically insignificant with p-value at 0.520 (0.524), indicating that our instruments satisfy the overidentifying restrictions. While a definite test of exogeneity does not exist (e.g. Roberts and Whited, 2012), these results together with our attempts at dealing with the above mentioned potential violations of the exclusion restriction suggest that our overall results survive the endogeneity concerns.

6.4 Firm Value and CSR

Table 4 presents the results of the tests that firm-level CSR is associated with higher firm valuation as measured by *Tobin's Q*. Specifications 1 and 2 show that firm value increases with CSR for both CSR measures. In specifications 3 and 4, we include CSR together with the firm controls. In terms of economic significance, specifications 3 and 4 reveal that a one-standard-deviation increase in *CSR1* (*CSR2*) increases *Tobin's Q* by 0.087 (0.073), which is a 5% (4%) increase relative to the average *Tobin's Q* of 1.885 (from Table 1). When we interact firm CSR with the *Advertising* variable (specifications 5 and 6), the coefficients on the interaction terms have the predicted signs and are statistically significant at the 5% level or better. For a firm with average advertising expenditure, the absolute value of the coefficient of CSR on firm value is larger by 0.356 (0.206) for *CSR1* (*CSR2*) than that of a zero-advertising firm. This is a significant increase in economic magnitude by 20% (28%) from the coefficient of 1.821 (0.725) for *CSR1* (*CSR2*) for a zero-advertising firm.

[Insert Tables 4 and 5 here]

Table 5 presents the IV estimation of firm value on CSR. To conduct this test we again use the political affiliation of the state where the firm is headquartered. Note also that if Democratic states have higher taxes as shown by Heider and Ljungqvist (2015), our political instruments may be correlated with firm value. However, according to Di Giuli and Kostovetsky (2014), firms do more CSR in Democratic states, which then should lead to *higher* firm value, not *lower* firm value as should be the case according to the tax story. Nonetheless, our regressions include state taxes to account for any omitted correlation. Continuing our discussion of exclusion restrictions, it may be argued that technology firms with high growth options have low firm risk and are also more likely to both invest in CSR and to locate in Silicon Valley or in Boston, which are located in traditionally Democratic states. However, since we use industry fixed-effects in both stages of our IV estimation, geographic clustering of industries should not be a concern. Moreover, the argument above goes against the evidence in Campbell and Vuolteenaho (2004) that suggests that high growth options firms have high betas.

The results in Table 5 show that instrumented CSR has a positive and significant effect over firm value as predicted by the theory (the table repeats the first stage regressions from Table 3). In columns 2 and 4 with industry and year fixed effects, the coefficients on the interaction terms have the predicted signs and are statistically significant. For a firm with average advertising expenditure, the coefficient of CSR on firm value is larger by 1.109 (0.639) for *CSR1* (*CSR2*) than that of a zero-advertising firm. This is a significant increase in economic magnitude by 42% (47%) from the coefficient of 2.639 (1.347) for

CSR1 (*CSR2*) for a zero-advertising firm. Again, given that year fixed effects may absorb the time-variation in the political instruments excessively, we report results also without year fixed effects (see columns 6 and 8). Overall the results are similar to those with year fixed effects. As with the IV regressions of beta, we can only calculate Hansen's J statistic that allows for clustered errors when we drop the time fixed effects. Hansen's J statistic for instrumenting *CSR1 (CSR2)* is 1.364 (1.262), which is statistically insignificant with p-value at 0.506 (0.532), indicating that our instruments satisfy the overidentifying restrictions.

6.5 CSR and Cyclicality of Profits

This subsection offers evidence in support of proposition 3. Our results provide corroborating evidence for the mechanism studied in this paper, because if CSR firms have lower exposure to aggregate shocks and consequently lower systematic risk, then their profits should be less cyclical, *i.e.* less sensitive to changes in GDP.

Table 6 presents panel regressions of changes in firm profitability on *GDP growth* and *GDP growth* interacted with CSR. We measure changes in firm profitability with year-on-year changes in *ROA* (return on assets), and use the two CSR measures, *CSR1* and *CSR2*. We show results without firm controls (specifications 1 and 2) and with firm controls (specifications 3 and 4). All regressions include industry and year fixed effects. The presence of year fixed effects implies that *GDP growth* is omitted from the regression. As predicted by the model the interaction between CSR and *GDP growth* is negative and statistically significant. The results show that changes in *ROA* co-move less with *GDP growth* for firms with higher levels of CSR.

[Insert Table 6 here]

7 Conclusion

This paper studies a mechanism through which CSR policies affect firms' systematic risk based on the premise that CSR is a product differentiation strategy. Our theory and evidence provide evidence that consumers are important agents in influencing firm policies and their risk profiles, in line with recent CEO survey evidence showing that consumers are more important than investors in determining firms' CSR policies. This paper thus fills a gap in the literature by formalizing and testing a channel through which CSR policies affect firm systematic risk and value. The paper also contributes to the literature by offering an instrumental variables estimation that attempts to deal with potential endogeneity of CSR.

Modeling consumers that are heterogenous in wealth and where CSR goods are superior goods is a potential avenue for extending our CSR model. We believe that such a model would offer similar predictions to our current model, if wealthy consumers, who buy the superior CSR goods, have also more stable demands across the business cycle. Moreover, we recognize that not all CSR activities are geared towards customer loyalty. In a richer model, it would be interesting to study the relationship between CSR and employee loyalty and the implications of that relationship.

Our results have practical capital budgeting, portfolio selection and policy implications. Beta is the major parameter used in estimating the cost of equity. Given our results on beta, companies with higher CSR have lower cost of equity. Also, the choice of securities to include in a portfolio relies partly on the degree to which the securities co-move with the market. Including stocks with higher CSR would have the effect of lowering the overall riskiness of the portfolio. In addition, projects that increase firms' reputation for CSR should be discounted with lower cost of equity, compared to otherwise similar projects. However, our theory cautions that the benefits from investing in CSR are tied to the proportion of firms already engaging in CSR relative to the total demand for CSR. Thus we do not intend to claim that investing in CSR is in the best interest of all firms or at all times.

Appendix

The Appendix contains proofs of the propositions in the paper.

A Proofs

Proof of Proposition 1. Consider the date-2 investor optimization problem:

$$\max_{c_l} \frac{C_2^{1-\gamma}}{1-\gamma},$$

subject to the budget constraint,

$$W_2 = \int_0^1 p_i c_i di. \tag{A.1}$$

Letting λ_2 be the Lagrange multiplier associated with equation (A.1). The first order sufficient and necessary conditions for an interior solution are equations (A.1) and

$$\begin{aligned} \alpha C_2^{-\gamma} \left(\int_0^\mu c_i^{\sigma_G} di\right)^{\frac{\alpha}{\sigma_G}-1} \left(\int_\mu^1 c_i^{\sigma_P} di\right)^{\frac{1-\alpha}{\sigma_P}} c_l^{\sigma_G-1} &= \lambda_2 p_l, \qquad \text{all } 0 \le l \le \mu, \\ (1-\alpha) C_2^{-\gamma} \left(\int_0^\mu c_i^{\sigma_G} di\right)^{\frac{\alpha}{\sigma_G}} \left(\int_\mu^1 c_j^{\sigma_P} dj\right)^{\frac{1-\alpha}{\sigma_P}-1} c_k^{\sigma_P-1} &= \lambda_2 p_k, \qquad \text{all } \mu \le k \le 1. \end{aligned}$$

Multiplying both sides of the equations above by the respective consumption level and integrating over the relevant range gives

$$\alpha C_2^{1-\gamma} = \lambda_2 \int_0^\mu p_i c_i di,$$

$$(1-\alpha) C_2^{1-\gamma} = \lambda_2 \int_\mu^1 p_j c_j dj.$$

Eliminating λ_2 we see that α is the expenditure share of CSR goods:

$$\int_0^\mu p_i c_i di = \frac{\alpha}{1-\alpha} \int_\mu^1 p_j c_j dj.$$

Also, $C_2^{1-\gamma} = \lambda_2 W_2$. Take the ratio of two conditions for $0 \le i, l \le \mu$ to get

$$c_i = \left(\frac{p_i}{p_l}\right)^{\frac{1}{\sigma_G - 1}} c_l, \tag{A.2}$$

and the ratio of two conditions for $\mu \le j, k \le 1$ to get

$$c_j = \left(\frac{p_j}{p_k}\right)^{\frac{1}{\sigma_P - 1}} c_k. \tag{A.3}$$

Replacing (A.2) and (A.3) back in the first order conditions

$$\begin{aligned}
\alpha C_2^{-\gamma}\left(\int_0^{\mu} p_i^{\frac{\sigma_G}{\sigma_G-1}}di\right)^{\frac{\alpha}{\sigma_G}-1}\left(\int_{\mu}^{1} p_i^{\frac{\sigma_P}{\sigma_P-1}}\right)^{\frac{1-\alpha}{\sigma_P}} p_l^{\frac{1-\alpha}{\sigma_G-1}} c_l^{\alpha-1} p_k^{-\frac{1-\alpha}{\sigma_P-1}} c_k^{1-\alpha} &= \lambda_2, \\
(1-\alpha)\, C_2^{-\gamma}\left(\int_0^{\mu} p_i^{\frac{\sigma_G}{\sigma_G-1}}\right)^{\frac{\alpha}{\sigma_G}}\left(\int_{\mu}^{1} p_j^{\frac{\sigma_P}{\sigma_P-1}}dj\right)^{\frac{1-\alpha-\sigma_P}{\sigma_P}} p_l^{-\frac{\alpha}{\sigma_G-1}} c_l^{\alpha} p_k^{\frac{\alpha}{\sigma_P-1}} c_k^{-\alpha} &= \lambda_2.
\end{aligned}$$

The ratio of these two equations yields:

$$\frac{\alpha\left(\int_{\mu}^{1} p_i^{\frac{\sigma_P}{\sigma_P-1}}\right)}{(1-\alpha)\left(\int_0^{\mu} p_i^{\frac{\sigma_G}{\sigma_G-1}}\right)}\frac{p_l^{\frac{1}{\sigma_G-1}}}{p_k^{\frac{1}{\sigma_P-1}}}c_k = c_l.$$

Replacing all in the budget constraint:

$$\begin{aligned}
W_2 &= \int p_i c_i \\
&= \int_0^{\mu} p_i\left(\frac{p_i}{p_l}\right)^{\frac{1}{\sigma_G-1}} c_l di + \int_{\mu}^{1} p_j\left(\frac{p_j}{p_k}\right)^{\frac{1}{\sigma_P-1}} c_k dj \\
&= \frac{1}{1-\alpha}\left(\int_{\mu}^{1} p_i^{\frac{\sigma_P}{\sigma_P-1}}\right)\frac{c_k}{p_k^{\frac{1}{\sigma_P-1}}},
\end{aligned}$$

from which we get the demand functions:

$$c_k = (1-\alpha)\frac{p_k^{\frac{1}{\sigma_P-1}}}{\int_{\mu}^{1} p_i^{\frac{\sigma_P}{\sigma_P-1}}di}W_2,$$

and

$$c_l = \alpha\frac{p_l^{\frac{1}{\sigma_G-1}}}{\int_0^{\mu} p_i^{\frac{\sigma_G}{\sigma_G-1}}di}W_2.$$

Turn now to the firms' problems. Using the demand functions from the investor's problem, the first order necessary and sufficient conditions for firms are:

$$\begin{aligned}
\sigma_G p_j x_j &= wAx_j \\
\sigma_P p_k x_k &= wAx_k,
\end{aligned}$$

so that profits are

$$\pi_j = (1-\sigma_j)\, p_j x_j.$$

By Walras' law, the equilibrium requires a price normalization. We normalize prices such that the price level of the aggregate consumption good equals 1. Define

$$P = \min_{c_l\in\{c_l: C_2=1\}}\int_0^1 p_l c_l dl.$$

It can be shown that the solution yields

$$P=\alpha^{-\alpha}\left(1-\alpha\right)^{-(1-\alpha)}\left(\int_0^\mu p_i^{\frac{\sigma_G}{\sigma_G-1}}di\right)^{-\alpha\frac{1-\sigma_G}{\sigma_G}}\left(\int_\mu^1 p_k^{\frac{\sigma_P}{\sigma_P-1}}dk\right)^{-(1-\alpha)\frac{1-\sigma_P}{\sigma_P}}.$$

If $P=1$, and setting $p_k=p_P$ for all $k\in[\mu,1]$ and $p_l=p_G$ for all $l\in[0,\mu]$, then

$$p_P=\left(\alpha\mu^{\frac{1-\sigma_G}{\sigma_G}}\right)^{\alpha}\left(\left(1-\alpha\right)\left(1-\mu\right)^{\frac{1-\sigma_P}{\sigma_P}}\right)^{(1-\alpha)}\left(\frac{p_G}{p_P}\right)^{-\alpha}.$$

From the firms' problem

$$\frac{p_P}{p_G}=\frac{\sigma_G}{\sigma_P},$$

and we arrive at

$$\begin{aligned}p_P&=\bar{p},\\ p_G&=\frac{\sigma_P}{\sigma_G}\bar{p},\end{aligned}$$

where

$$\bar{p}=\left(\alpha\mu^{\frac{1-\sigma_G}{\sigma_G}}\right)^{\alpha}\left(\left(1-\alpha\right)\left(1-\mu\right)^{\frac{1-\sigma_P}{\sigma_P}}\right)^{(1-\alpha)}\left(\frac{\sigma_P}{\sigma_G}\right)^{-\alpha}.$$

By construction this solution obeys $P=1$.

Now we solve the labor market clearing condition. From the investor's problem:

$$\begin{aligned}c_G&=\frac{\alpha\left(1-\mu\right)}{\left(1-\alpha\right)\mu}\frac{p_P}{p_G}c_P\\ &=\frac{\alpha\left(1-\mu\right)}{\left(1-\alpha\right)\mu}\frac{\sigma_G}{\sigma_P}c_P.\end{aligned}\tag{A.4}$$

Replacing these expressions in the labor market clearing condition, $\int_0^1 l_i di=L$, gives

$$\mu Ac_G+\left(1-\mu\right)Ac_P=L.$$

Using equation (A.4) again:

$$c_P=\bar{x}\frac{1-\alpha}{1-\mu}A^{-1}\tag{A.5}$$

$$c_G=\bar{x}\frac{\sigma_G}{\sigma_P}\frac{\alpha}{\mu}A^{-1},\tag{A.6}$$

where

$$\bar{x}=\frac{L\sigma_P}{\alpha\sigma_G+\left(1-\alpha\right)\sigma_P}.$$

We then use one of the first order conditions from the firms' problem to get the wage rate,

$$w=\bar{p}\sigma_P A^{-1}.$$

Profits are

$$\pi_G=\bar{p}\bar{x}\left(1-\sigma_G\right)\frac{\alpha}{\mu}A^{-1},$$

for CSR firms and

$$\pi_P = \bar{p}\bar{x}\left(1-\sigma_P\right)\frac{1-\alpha}{1-\mu}A^{-1},$$

for non-CSR firms. Finally, under our price normalization, $C_2 = W_2$, and

$$\lambda_2 = C_2^{-\gamma} = \left[\bar{p}\bar{x}\right]^{-\gamma} A^{\gamma 1}.$$

■

Proof of Proposition 2. This proposition discusses conditions under which $\mu < \tau_P$, in terms of exogenous model parameters. Note that the expenditure shares of CSR and non-CSR goods are α and $1-\alpha$, respectively, so that

$$\mu p_G c_G = \frac{\alpha}{1-\alpha}\left(1-\mu\right) p_P c_P.$$

Because operating profits are $\pi_j = \left(1-\sigma_j\right) p_j c_j$, the difference in profits $\pi_G - \pi_P$ is proportional to

$$\Delta \equiv \left(1-\sigma_G\right)\frac{\alpha}{\mu} - \left(1-\sigma_P\right)\frac{1-\alpha}{1-\mu}. \tag{A.7}$$

Inserting this result into the equilibrium condition (12) proves that the sign of $\mu - \tau_P$ (or $\tau_G - \tau_P$) is given only by the sign of Δ. This result is helpful in isolating the effect of demand loyalty on systematic risk studied in this paper.

To show the main result in the proposition note that $\Delta > 0$ if, and only if,

$$\frac{\left(1-\sigma_G\right)\alpha}{1-\sigma_P+\left(\sigma_P-\sigma_G\right)\alpha} > \mu.$$

The left hand side of the inequality is strictly increasing in α varying between 0 and 1. Define $\bar{\alpha}$ implicitly as

$$\frac{\left(1-\sigma_G\right)\bar{\alpha}}{1-\sigma_P+\left(\sigma_P-\sigma_G\right)\bar{\alpha}} = \tau_P.$$

We can solve for $\bar{\alpha}$ to get the expression in the proposition. Let $\alpha < \bar{\alpha}$ and assume by way of contradiction that $\mu > \tau_P$. Then, by definition of $\bar{\alpha}$,

$$\tau_P > \frac{\left(1-\sigma_G\right)\alpha}{1-\sigma_P+\left(\sigma_P-\sigma_G\right)\alpha}.$$

But, $\mu > \tau_P$, or equivalently, $\Delta > 0$, implies that the right hand side of this inequality is larger than μ, which is a contradiction. Now, let $\mu < \tau_P$. Then,

$$\frac{\left(1-\sigma_G\right)\alpha}{1-\sigma_P+\left(\sigma_P-\sigma_G\right)\alpha} < \mu < \tau_P = \frac{\left(1-\sigma_G\right)\bar{\alpha}}{1-\sigma_P+\left(\sigma_P-\sigma_G\right)\bar{\alpha}}.$$

The inequalities imply $\alpha < \bar{\alpha}$. ■

Proof of Proposition 3. Write R_π using the equilibrium values of π_j and noting that $\mu = \tau_G^*$:

$$R_\pi = \frac{\left(1-\sigma_G\right)\frac{\alpha}{\mu}\bar{p}\bar{x}A^{-1} - \mu\left(1+r\right)}{\left(1-\sigma_P\right)\frac{1-\alpha}{1-\mu}\bar{p}\bar{x}A^{-1} - \tau_P\left(1+r\right)}.$$

Before continuing, note that stock prices are

$$\begin{aligned} Q_j &= E[m\pi_j] - \tau_j \\ &= \bar{m}[\bar{p}\bar{x}]^{1-\gamma}(1-\sigma_j)\frac{\alpha_j}{\mu_j}E\left[A^{-(1-\gamma)}\right] - \tau_j. \end{aligned} \tag{A.8}$$

At an interior solution the price of the marginal CSR firm obeys $Q_G^* = Q_P$, which can be written as

$$\bar{m}[\bar{p}\bar{x}]^{1-\gamma}E\left[A^{-(1-\gamma)}\right]\Delta = \tau_G^* - \tau_P, \tag{A.9}$$

where we have used the definition of Δ in equation (A.7). Now take the derivative of R_π with respect to A^{-1} :

$$\begin{aligned} \frac{dR_\pi}{dA^{-1}} &= (1+r)\bar{p}\bar{x}\frac{-(1-\sigma_G)\frac{\alpha}{\mu}\tau_P + \mu(1-\sigma_P)\frac{1-\alpha}{1-\mu}}{\left[(1-\sigma_P)\frac{1-\alpha}{1-\mu}\bar{p}\bar{x}A^{-1} - \tau_P(1+r)\right]^2} \\ &\propto -(1-\sigma_G)\frac{\alpha}{\mu}\tau_P + \mu(1-\sigma_P)\frac{1-\alpha}{1-\mu} \\ &= (1-\sigma_G)\frac{\alpha}{\mu}(\mu-\tau_P) - \mu\Delta \\ &= \left\{(1-\sigma_G)\frac{\alpha}{\mu}\bar{m}[\bar{p}\bar{x}]^{1-\gamma}E\left[A^{-(1-\gamma)}\right] - \mu\right\}\Delta \\ &= Q_G^*\Delta. \end{aligned}$$

The third line uses the definition of Δ and combines the terms with $(1-\sigma_G)\frac{\alpha}{\mu}$. The fourth line uses equation (A.9) to eliminate $\mu - \tau_P$ and the last line uses the equilibrium value of Q_G^* in equation (A.8). It follows that $\frac{dR_\pi}{dA^{-1}} \gtreqless 0$ if, and only if, $\Delta \gtreqless 0$. From (A.9), and noting that $\mu = \tau_G^*$ in equilibrium, then $\Delta \gtreqless 0$ if and only if $\tau_P - \mu \lesseqgtr 0$. From Proposition 2, $\tau_P - \mu \lesseqgtr 0$ if and only if $\bar{\alpha} \lesseqgtr \alpha$. ■

Proof of Proposition 4. Recall that the gross return on firm i is defined as $1 + r_i \equiv (\pi_i - \tau_i(1+r))/Q_i$ and that the value-weighted market return is $1+r_M \equiv \int(\pi_i - \tau_i(1+r))\,di/\int Q_j dj$. We wish to solve for $\beta_j = Cov(r_j, r_M)/Var(r_M)$. Consider first solving for $Cov(r_j, r_M)$. Because τ_i and r are constants

$$Cov(r_j, r_M) = Cov\left(\frac{\pi_j}{Q_j}, \int \frac{\pi_i}{Q_i}\frac{Q_i}{\int Q_l dl}di\right).$$

Taking $Q_j \int Q_l dl$ out of the covariance operator and substituting in for the value of π_i gives:

$$Cov(r_j, r_M) = \frac{\left(\bar{p}\bar{x}(1-\sigma_j)\frac{\alpha_j}{\mu_j}\right)\left(\int \bar{p}\bar{x}(1-\sigma_i)\frac{\alpha_i}{\mu_i}di\right)}{Q_j\int Q_j dj}Var\left(A^{-1}\right).$$

Consider now solving for $Var(r_M)$. Following similar steps as above

$$Var(r_M) = \frac{\left(\int \bar{p}\bar{x}(1-\sigma_i)\frac{\alpha_i}{\mu_i}di\right)^2}{\left(\int Q_j dj\right)^2}Var\left(A^{-1}\right).$$

Thus,

$$\beta_j = \frac{\bar{p}\bar{x}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}}{Q_j}\left[\frac{\int \bar{p}\bar{x}\left(1-\sigma_i\right)\frac{\alpha_i}{\mu_i}di}{\int Q_i di}\right]^{-1}$$

or solving the integral,

$$\beta_j = \frac{\left(1-\sigma_j\right)\alpha_j}{\left(1-\sigma_G\right)\alpha_G + \left(1-\sigma_P\right)\alpha_P}\frac{\int Q_i di}{\mu_j Q_j}. \tag{A.10}$$

For completeness, calculate the total stock market value:

$$\begin{aligned}\int Q_i di &= \int_0^{\mu} Q_i di + (1-\mu) Q_P \\ &= \int_0^{\mu} \left(E\left(m\pi_G\right) - \tau_{Gi}\right) di + (1-\mu) Q_P.\end{aligned}$$

Note that $\int_0^{\mu} \tau_{Gi} di = \frac{1}{2}\mu^2$ and $E\left(m\pi_G\right) = Q_G^* + \tau_G^* = Q_G^* + \mu$. Therefore,

$$\int Q_i di = Q_G^* + \frac{1}{2}\mu^2.$$

Using (A.8) and (A.10) we get

$$\beta_j = \frac{\left(1-\sigma_j\right)\alpha_j}{\bar{m}\left[\bar{p}\bar{x}\right]^{1-\gamma}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}E\left[A^{-(1-\gamma)}\right] - \tau_j}\frac{\int Q_i di}{\mu_j\left[\left(1-\sigma_G\right)\alpha_G + \left(1-\sigma_P\right)\alpha_P\right]},$$

from which we get that β_j is increasing in σ_j, holding all else constant. ■

Proof of result in Footnote 8

Using the Euler equation we obtain:

$$\begin{aligned}E\left(r_j - r\right) &= -E(m)^{-1} Cov\left(m, r_j\right) \\ &= -E(m)^{-1} Q_j^{-1} Cov\left(m, \pi_j\right).\end{aligned}$$

The expected excess return is determined by the covariance of the stock return with the intertemporal marginal rate of substitution, $Cov\left(m, r_j\right)$. This covariance depends on how aggregate productivity affects both variables. We now prove that:

Proposition 5 *Firm j's equilibrium expected excess stock return is:*

$$E\left(r_j - r\right) = \frac{\bar{p}\bar{x}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}}{\bar{m}\left[\bar{p}\bar{x}\right]^{1-\gamma}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}E\left[A^{\gamma-1}\right] - \tau_j}\frac{-Cov\left(A^{-1}, A^{\gamma}\right)}{E\left(A^{\gamma}\right)}. \tag{A.11}$$

The expected excess return is increasing in σ_j. Furthermore, at an interior solution for μ, the marginal CSR firm has

$$E\left(r_P - r\right) > E\left(r_G^* - r\right) \text{ iff } \bar{\alpha} > \alpha.$$

Proof of Proposition 5. The investor's stochastic discount factor is,

$$m = \bar{m}\left[\bar{p}\bar{x}\right]^{-\gamma} A^{\gamma}.$$

Then, we have

$$\begin{aligned} Cov\left(m, \pi_j\right) &= Cov\left(\bar{m}\left[\bar{p}\bar{x}\right]^{-\gamma} A^{\gamma}, \bar{p}\bar{x}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}A^{-1}\right) \\ &= \bar{m}\left[\bar{p}\bar{x}\right]^{1-\gamma}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}Cov\left(A^{\gamma}, A^{-1}\right). \end{aligned}$$

Using equation (A.9), and substituting in the various terms, expected stock excess returns for firm j are

$$E\left(r_j - r\right) = \frac{\bar{p}\bar{x}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}}{\bar{m}\left[\bar{p}\bar{x}\right]^{1-\gamma}\left(1-\sigma_j\right)\frac{\alpha_j}{\mu_j}E\left[A^{-(1-\gamma)}\right]-\tau_j}\frac{-Cov\left(A^{\gamma}, A^{-1}\right)}{E\left(A^{\gamma}\right)}.$$

For any CSR firm, the ratio of expected excess returns to that of a non-CSR firm is:

$$\frac{E\left(r_G - r\right)}{E\left(r_P - r\right)} = \frac{\left(1-\sigma_G\right)\frac{\alpha}{\mu}}{\left(1-\sigma_P\right)\frac{1-\alpha}{1-\mu}}\frac{Q_P}{Q_G}.$$

The the marginal CSR firm:

$$\frac{E\left(r_G^* - r\right)}{E\left(r_P - r\right)} = 1 + \frac{\Delta}{\left(1-\sigma_P\right)\frac{1-\alpha}{1-\mu}}.$$

Therefore,

$$E\left(r_P - r\right) \gtreqless E\left(r_G^* - r\right) \text{ if, and only if, } \tau_P - \mu \gtreqless 0.$$

From Proposition 2, $\tau_P - \mu \lesseqgtr 0$ if and only if $\bar{\alpha} \lesseqgtr \alpha$. ■

The proposition gives an expression for firm j's expected excess return. The first term in the expression gives the profit sensitivity to the aggregate shock. It amplifies the term $Cov\left(A^{-1}, A^{\gamma}\right)$ that captures how profits co-vary with the stochastic discount factor. This covariance is negative for any risk aversion parameter $\gamma > 0$ and thus $E\left(r_j - r\right) > 0$. If investors are risk neutral, *i.e.* $\gamma = 0$, then $Cov\left(A^{-1}, A^{\gamma}\right) = 0$ and $E\left(r_j - r\right) = 0$.

Holding μ constant, $E\left(r_j - r\right)$ increases with σ_j. Intuitively, lower σ_j reduces the sensitivity of the firm's net profits to aggregate shocks. Such a firm has relatively higher payoffs in states of lower consumption and high marginal utility, and is thus less risky to a risk averse investor and worth more.

The lower price elasticity of demand, by increasing firm profits and stock prices, produces a feedback equilibrium effect via an increase in the proportion of CSR firms, μ. The proposition gives a stark result regarding the equilibrium riskiness of CSR versus non-CSR firms. We show that the proportion of CSR firms determines the relative riskiness of CSR versus non-CSR firms: if $\mu \leq \tau_P$ (or $\alpha \leq \bar{\alpha}$) then the marginal CSR firm has $E\left(r_G^* - r\right) \leq E\left(r_P - r\right)$. In this case, infra-marginal CSR firms also have higher prices and lower expected returns than non-CSR firms. Therefore, if $\mu \leq \tau_P$, then on average CSR firms have lower expected excess returns. When $\mu > \tau_P$ (or $\alpha > \bar{\alpha}$), then $E\left(r_P - r\right) < E\left(r_G^* - r\right)$ and the marginal CSR firm has higher adoption costs, profit sensitivity and systematic risk than non-CSR firms. By continuity, infra-marginal firms with costs close to $\tau_G^* = \mu$ also have higher expected returns, but there may be firms with low enough τ_{Gi} such that $E\left(r_P - r\right) > E\left(r_{Gi} - r\right)$.

B Variable Definitions

[Insert Table A.I here]

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Table 1
Summary statistics

This table reports the summary statistics (number of observations, mean, standard deviation, minimum, 25th, 50th (median) and 75th percentiles and maximum) for all variables in Panel A. The Appendix provides the definition of variables. The sample period is from 2004 to 2015 for firm beta and Tobin's Q, and from 2003 to 2014 for all other variables (we lag all independent variables by one year). All firm variables (except for the two CSR measures and diversification) are winsorized at the 1% and 99% levels. Panel B reports the average CSR scores for Fama-French 12 industries ranked by *CSR1* in descending order.

Panel A: Summary statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	Firm-years	Mean	Std.Dev.	Min	25%	Median	75%	Max
Firm beta	28,578	1.228	0.461	0.329	0.904	1.171	1.495	2.618
Tobin's Q	28,578	1.885	1.270	0.759	1.106	1.443	2.132	8.410
CSR1	28,578	-0.003	0.037	-0.153	-0.020	0.000	0.016	0.360
CSR2	28,578	-0.016	0.072	-0.350	-0.050	-0.010	0.014	0.614
Operating leverage	25,516	0.841	0.458	-0.547	0.665	0.924	1.054	2.435
R&D	28,578	0.035	0.079	0.000	0.000	0.000	0.028	0.481
Advertising	28,578	0.010	0.028	0.000	0.000	0.000	0.004	0.179
Leverage	28,174	0.194	0.202	0.000	0.012	0.141	0.308	0.890
CAPEX	27,901	0.043	0.056	0.000	0.009	0.025	0.054	0.322
Cash	28,282	0.461	1.229	0.001	0.031	0.101	0.336	9.577
Size	28,282	7.283	1.705	3.673	6.049	7.183	8.362	12.019
Earnings variability	25,637	1.102	1.479	0.066	0.328	0.605	1.225	9.649
Diversification	28,284	2.213	1.691	1.000	1.000	1.000	3.000	11.000
State tax	28,284	0.067	0.030	0.000	0.060	0.075	0.088	0.120
ROA	27,360	0.092	0.143	-0.604	0.036	0.104	0.162	0.424
GDP Growth	28,578	0.940	1.708	-3.624	0.815	1.448	1.795	2.830
President vote, Democrats	28,578	0.520	0.083	0.247	0.455	0.529	0.584	0.925
Congress, Democrats	28,578	0.584	0.294	0.000	0.278	0.700	0.821	1.000
State government, Democrats	28,578	0.516	0.389	0.000	0.000	0.500	1.000	1.000

Panel B: CSR by industry

Industry	CSR1		CSR2	
	Mean	Rank	Mean	Rank
Consumer Non-Durables	0.005	1	-0.004	2
Business Equipment	0.004	2	-0.001	1
Finance	0.000	3	-0.007	3
Shops	-0.004	4	-0.017	4
Utilities	-0.004	5	-0.025	9
Telecoms	-0.004	6	-0.017	5
Healthcare	-0.005	7	-0.018	6
Consumer Durables	-0.006	8	-0.022	7
Manufacturing	-0.007	9	-0.024	8
Chemicals	-0.007	10	-0.029	11
Other	-0.009	11	-0.027	10
Energy	-0.022	12	-0.056	12

Table 2
Beta regressions

This table reports the results of panel regressions of firm beta on two CSR measures under several specifications: without firm controls (specifications 1 and 2), with firm controls (specifications 3 and 4), and with CSR measures interacted with *lagged advertising* (specifications 5 and 6). The CSR measure used in the regression is indicated on top of each specification. The sample is from 2004 to 2015. All regressions include industry and year fixed effects. Standard errors are clustered by firm and year. The numbers in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The Appendix contains a detailed description of all the variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Firm beta					
CSR variable included in the regression	CSR1	CSR2	CSR1	CSR2	CSR1	CSR2
lagged CSR variable	-0.945***	-0.403***	-0.377***	-0.139*	-0.227	-0.070
	(-5.681)	(-4.836)	(-2.790)	(-1.957)	(-1.557)	(-0.902)
lagged advertising × lagged CSR					-9.828***	-4.949**
					(-2.627)	(-2.396)
lagged advertising			-0.552***	-0.567***	-0.522***	-0.582***
			(-2.915)	(-2.993)	(-2.833)	(-3.112)
lagged operating leverage			-0.018	-0.018	-0.017	-0.017
			(-1.204)	(-1.200)	(-1.179)	(-1.178)
lagged R&D			0.635***	0.630***	0.637***	0.631***
			(5.106)	(5.046)	(5.106)	(5.046)
lagged leverage			0.133**	0.135**	0.134**	0.135**
			(1.998)	(2.026)	(2.016)	(2.040)
lagged CAPEX			0.216	0.213	0.218	0.214
			(1.449)	(1.426)	(1.461)	(1.434)
lagged cash			0.015**	0.015**	0.015**	0.015**
			(2.236)	(2.221)	(2.253)	(2.240)
lagged size			-0.035***	-0.037***	-0.035***	-0.036***
			(-3.837)	(-4.072)	(-3.836)	(-4.056)
lagged earnings variability			0.042***	0.043***	0.042***	0.042***
			(6.822)	(6.848)	(6.805)	(6.833)
lagged diversification			-0.004	-0.004	-0.004	-0.004
			(-0.970)	(-0.966)	(-0.982)	(-0.968)
lagged state tax			-0.202	-0.205	-0.211	-0.213
			(-1.473)	(-1.495)	(-1.541)	(-1.556)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of firm-years	28,578	28,578	25,073	25,073	25,073	25,073
adj. R^2	0.135	0.133	0.188	0.187	0.188	0.188

Table 3
IV regressions for firm beta

This table reports the results of instrumental variable (IV) estimation for firm beta. The endogenous (instrumented) variable is the CSR measure. The instruments for CSR are based on the firm's headquarters' state political environment. *President vote, democrats* is the proportion of votes received by the democratic candidate for president election. *Congress, democrats* is 0.5×proportion of senators who are democrats + 0.5×proportion of representatives who are democrats. *State government, democrats* is 0.5 ×dummy if a governor is democrat + 0.25×dummy if upper Chamber is controlled by democrats + 0.25×dummy if lower Chamber is controlled by democrats. The CSR measure used in the regression is indicated on top of each first stage regression. The sample is from 2004 to 2015. Specifications 1 to 4 (5 to 8) include industry and year fixed effects (industry fixed effects only). Each regression includes all of the control variables as in specifications 3 and 4 in Table 2. Standard errors are clustered by firm and year. The numbers in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The Kleibergen-Paap rank Wald F-statistics (weak instruments test) are reported for the first stage regressions. The Appendix contains a detailed description of all the variables.

Dependent variable	(1) CSR1	(2) Firm beta	(3) CSR2	(4) Firm beta	(5) CSR1	(6) Firm beta	(7) CSR2	(8) Firm beta
Regression stage	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
President vote, Democrats	0.037***		0.074***		0.062***		0.127**	
	(3.201)		(3.189)		(3.011)		(2.373)	
Congress, Democrats	0.008***		0.013**		0.002		0.000	
	(2.635)		(2.334)		(0.313)		(0.006)	
State government, Democrats	-0.004***		-0.007***		-0.005***		-0.010***	
	(-2.777)		(-2.917)		(-3.749)		(-4.149)	
instrumented CSR		-0.706		-0.419		-1.239		-0.675
		(-0.623)		(-0.707)		(-0.570)		(-0.580)
instrumented CSR × lagged advertising		-20.482**		-9.088*		-28.349***		-16.422***
		(-2.181)		(-1.821)		(-2.785)		(-2.680)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	No	No	No	No
Number of firm-years	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
adj. R^2	0.216	0.204	0.185	0.204	0.192	0.158	0.144	0.158
Weak instruments test, F-stat.	20.380		19.341		17.758		15.302	

Table 4
Tobin's Q regressions

This table reports the results of panel regressions of Tobin's Q on two CSR measures under several specifications: without firm controls (specifications 1 and 2), with firm controls (specifications 3 and 4), and with CSR measures interacted with *lagged advertising* (specifications 5 and 6). The CSR measure used in the regression is indicated on top of each specification. The sample is from 2004 to 2015. All regressions include industry and year fixed effects. Standard errors are clustered by firm and year. The numbers in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The Appendix contains a detailed description of all the variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Tobin's Q					
CSR variable included in the regression	CSR1	CSR2	CSR1	CSR2	CSR1	CSR2
lagged CSR variable	0.894*	0.531**	2.362***	1.016***	1.821***	0.725***
	(1.806)	(2.032)	(5.898)	(5.107)	(4.687)	(3.626)
lagged advertising × lagged CSR					35.611**	20.557***
					(2.536)	(2.743)
lagged advertising			4.413***	4.477***	4.304***	4.538***
			(4.784)	(4.849)	(4.796)	(5.038)
lagged operating leverage			0.004	0.004	0.003	0.003
			(0.141)	(0.133)	(0.094)	(0.085)
lagged R&D			3.917***	3.945***	3.912***	3.939***
			(9.195)	(9.259)	(9.208)	(9.275)
lagged leverage			-0.006	-0.014	-0.009	-0.016
			(-0.049)	(-0.122)	(-0.076)	(-0.146)
lagged CAPEX			1.877***	1.890***	1.871***	1.885***
			(5.274)	(5.288)	(5.244)	(5.257)
lagged cash			0.116***	0.117***	0.116***	0.116***
			(5.569)	(5.581)	(5.537)	(5.543)
lagged size			-0.100***	-0.093***	-0.101***	-0.093***
			(-7.787)	(-7.402)	(-7.840)	(-7.486)
lagged earnings variability			-0.049***	-0.050***	-0.048***	-0.049***
			(-5.882)	(-5.988)	(-5.802)	(-5.912)
lagged diversification			-0.016**	-0.016**	-0.016**	-0.016**
			(-2.029)	(-2.022)	(-2.028)	(-2.039)
lagged state tax			-0.105	-0.094	-0.074	-0.062
			(-0.205)	(-0.182)	(-0.145)	(-0.121)
Year and Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of firm-years	28,578	28,578	25,073	25,073	25,073	25,073
adj. R^2	0.168	0.169	0.287	0.286	0.288	0.287

Table 5
IV regressions for Tobin's Q

This table reports the results of instrumental variable (IV) estimation for Tobin's Q. The endogenous (instrumented) variable is the CSR measure. The instruments for CSR are based on the firm's headquarters' state political environment. *President vote, democrats* is the proportion of votes received by the democratic candidate for president election. *Congress, democrats* is 0.5×proportion of senators who are democrats + 0.5×proportion of representatives who are democrats. *State government, democrats* is 0.5 ×dummy if a governor is democrat + 0.25×dummy if upper Chamber is controlled by democrats + 0.25×dummy if lower Chamber is controlled by democrats. The CSR measure used in the regression is indicated on top of each first stage regression. The sample is from 2004 to 2015. Specifications 1 to 4 (5 to 8) include industry and year fixed effects (industry fixed effects only). Each regression includes all of the control variables as in specifications 3 and 4 in Table 2. Standard errors are clustered by firm and year. The numbers in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The Kleibergen-Paap rank Wald F-statistics (weak instruments test) are reported for the first stage regressions. The Appendix contains a detailed description of all the variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	CSR1	Tobin's Q	CSR2	Tobin's Q	CSR1	Tobin's Q	CSR2	Tobin's Q
Regression stage	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
President vote, Democrats	0.037***		0.074***		0.062***		0.127**	
	(3.201)		(3.189)		(3.011)		(2.373)	
Congress, Democrats	0.008***		0.013**		0.002		0.000	
	(2.635)		(2.334)		(0.313)		(0.006)	
State government, Democrats	-0.004***		-0.007***		-0.005***		-0.010***	
	(-2.777)		(-2.917)		(-3.749)		(-4.149)	
instrumented CSR		2.639		1.347		0.103		0.040
		(0.661)		(0.647)		(0.017)		(0.013)
instrumented CSR × lagged advertising		110.872**		63.905***		101.750*		66.444**
		(2.505)		(3.014)		(1.959)		(2.303)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	No	No	No	No
Number of firm-years	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
adj. R^2	0.216	0.311	0.185	0.311	0.192	0.282	0.144	0.282
Weak instruments test, F-stat.	20.380		19.341		17.758		15.302	

Table 6
Profitability regressions

This table reports the results of panel regressions of changes in ROA (return on assets) from the previous year on two CSR measures under several specifications: without firm controls (specifications 1 and 2), and with firm controls (specifications 3 and 4). The CSR measure used in the regression is indicated on top of each specification, and is interacted with *GDP growth*. The sample is from 2004 to 2015. All regressions include industry and year fixed effects. Standard errors are clustered by firm and year. The numbers in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The Appendix contains a detailed description of all the variables.

	(1)	(2)	(3)	(4)
Dependent variable	Change in ROA			
CSR variable included in the regression	CSR1	CSR2	CSR1	CSR2
CSR variable	0.011	0.005	0.007	0.004
	(0.992)	(0.944)	(0.746)	(0.866)
CSR × GDP growth	-0.016**	-0.009***	-0.017***	-0.009***
	(-2.052)	(-2.590)	(-2.610)	(-3.354)
lagged advertising			-0.004	-0.004
			(-0.273)	(-0.275)
lagged operating leverage			0.002*	0.002*
			(1.919)	(1.918)
lagged R&D			0.061***	0.061***
			(2.726)	(2.722)
lagged leverage			0.014***	0.014***
			(2.880)	(2.881)
lagged CAPEX			-0.074***	-0.073***
			(-3.291)	(-3.279)
lagged cash			-0.004***	-0.004***
			(-5.725)	(-5.735)
lagged size			-0.000	-0.000
			(-0.167)	(-0.191)
lagged earnings variability			0.000	0.000
			(0.333)	(0.334)
lagged diversification			0.000	0.000
			(1.016)	(1.023)
lagged state tax			0.009	0.009
			(0.626)	(0.631)
Year and Industry FE	Yes	Yes	Yes	Yes
Number of firm-years	24,300	24,300	21,662	21,662
adj. R^2	0.021	0.021	0.033	0.033

Appendix: Table A.I. Variables, definitions, and sources.

This table presents the variable definitions and data sources. Compustat and CRSP items are in brackets.

Variable	Definition	Source
Corporate Social Responsibility		
CSR1	We divide both the number of strengths and that of concerns for each firm-year across all six CSR categories by the maximum possible number of strengths and concerns combined in all six categories for each firm-year, to ensure comparability over time and across firms. We then subtract the scaled concerns from the scaled strengths to obtain a net measure. It is measured annually from 2003 through 2015.	MSCI's ESG Research.
CSR2	We divide the number of strengths (concerns) for each firm-year across all six CSR categories by the maximum possible number of strengths (concerns) in all six categories for each firm-year, to ensure comparability over time and across firms. We then subtract the scaled concerns from the scaled strengths to obtain a net measure. It is measured annually from 2003 through 2015.	
Firm and Industry Variables		
Firm β	It is defined as the estimated coefficients on market excess return in the daily regression of firm excess return on market excess return. It is measured annually from 2004 through 2015.	CRSP.
Tobin's Q	It is measured as the ratio of the market value of equity (fiscal year-end price [PRCC_F] times number of shares outstanding [CSHO]) plus book value of debt (total assets [AT] less book value of equity [CEQ]) to total assets [AT]. It is measured annually from 2004 through 2015.	
Operating leverage	We follow Kahl et al. (2014) to construct operating leverage. Operating leverage is measured as the sensitivity of growth in total operating costs to growth in sales. To construct it, for every firm and year, we calculate ex-ante expectations of operating costs [XOPR] and sales [SALE] based on the geometric growth rate over the previous two years.	
R&D	It is defined as R&D expenditure [XRD] over total assets [AT]. It is measured annually from 2003 through 2014. We set missing values to zero following the prior literature.	
Advertising	It is defined as advertising expenditures [XAD] over total assets [AT]. It is measured annually from 2003 through 2014. We set missing values to zero following the prior literature.	
Leverage	It is defined as long-term debt [DLTT] over total assets [AT]. It is measured annually from 2003 through 2014.	Compustat.
CAPEX	It is defined as capital expenditures [CAPX] over total assets [AT]. It is measured annually from 2003 through 2014.	
Cash	It is defined as the ratio of cash and marketable securities [CHE] to total assets [AT] net of cash and marketable securities (Opler et al., 1999). It is measured annually from 2003 through 2014.	
Size	It is defined as the log of total assets [AT]. It is measured annually from 2003 through 2014.	
Earnings variability	It is defined as the standard deviation of income before extraordinary items [IB] per share [CSHO] using a five-year rolling window. It is measured annually from 2003 through 2014.	
Diversification	It is measured as the number of three-digit SIC industries that a firm operates in. It is measured annually from 2003 through 2014.	
ROA	It is measured by the return on assets, which is defined as earnings before interest, taxes, depreciation and amortization [EBITDA] over total assets [AT]. It is measured annually from 2003 through 2015.	
State tax	It is defined as the highest-bracket state corporate income tax rate. State affiliation is determined by the location of firm headquarters. It is measured annually from 2003 through 2014.	Tax Foundation.
GDP growth	It is defined as the growth rate of gross domestic product. It is measured annually from 2003 through 2015.	Bureau of Economic Analysis.
Instrumental Variables		
President vote, Democrats	This variable is the proportion of votes in the state received by the Democratic candidate for president. It is measured annually from 2003 through 2015 based on elections taken place in previous years.	
Congress, Democrat	It is equal to 0.5 x proportion of Senators who are Democrats + 0.5 x proportion of Congressmen who are Democrats from a particular state. It is measured annually from 2003 through 2015 based on elections taken place in previous years.	Di Giuli and Kostovetsky (2014) and internet sources.
State government, Democrat	It is equal to 0.5 x dummy if a governor is Democrat + 0.25 x dummy if upper Chamber is controlled by Democrats + 0.25 x dummy if lower Chamber is controlled by Democrats. It is measured annually from 2003 through 2015 based on elections taken place in previous years.	

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