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**CORPORATE SOCIAL  
RESPONSIBILITY AND FIRM RISK:  
THEORY AND EMPIRICAL EVIDENCE**

Rui Albuquerque, Artyom Durnev and Yrjö  
Koskinen

***FINANCIAL ECONOMICS and  
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# **CORPORATE SOCIAL RESPONSIBILITY AND FIRM RISK: THEORY AND EMPIRICAL EVIDENCE**

**Rui Albuquerque, Boston University Católica-Lisboa School of Business and Economics, ECGI and CEPR**  
**Artyom Durnev, University of Iowa**  
**Yrjö Koskinen, Boston University and CEPR**

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Centre for Economic Policy Research  
77 Bastwick Street, London EC1V 3PZ, UK  
Tel: (44 20) 7183 8801, Fax: (44 20) 7183 8820  
Email: [cepr@cepr.org](mailto:cepr@cepr.org), Website: [www.cepr.org](http://www.cepr.org)

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## **ABSTRACT**

### **Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence\***

This paper presents an industry equilibrium model where firms can choose to engage in corporate social responsibility (CSR) activities. We model CSR activities as an investment in customer loyalty and show that CSR decreases systematic risk and increases firm value. These effects are stronger for firms producing differentiated goods and when consumers' expenditure share on CSR goods is small. We find supporting evidence for our predictions. In our empirical tests, we address a potential endogeneity problem by instrumenting CSR using data on the political affiliation of the firm's home state, and data on environmental and engineering disasters and product recalls.

JEL Classification: D43, G12, G32, L13 and M14

Keywords: corporate social responsibility, corporate valuation, customer loyalty, industry equilibrium and systematic risk

Rui Albuquerque  
School of Management  
Boston University  
595 Commonwealth Avenue  
Boston, MA 02215  
USA

Email: [ralbuque@bu.edu](mailto:ralbuque@bu.edu)

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[www.cepr.org/pubs/new-dps/dplist.asp?authorid=147792](http://www.cepr.org/pubs/new-dps/dplist.asp?authorid=147792)

Artyom Durnev  
Tippie College of Business  
University of Iowa  
108 John Pappajohn Building  
Iowa City, IA 52242  
USA

Email: [artem-durnev@uiowa.edu](mailto:artem-durnev@uiowa.edu)

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Yrjö Koskinen  
School of Management  
Boston University  
595 Commonwealth Avenue  
Boston, MA 02215  
USA

Email: yrjo@bu.edu

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# 1 Introduction

Corporate social responsibility (CSR) represents a growing strategic concern for corporations around the world, many of which are adopting CSR as a core management or board-level function. The Global Reporting Initiative (GRI) founded in the late 1990's, taken on by the United Nations Environment Program, has provided corporations with a reporting framework on their economic, environmental, and social sustainability. The success of this initiative is visible in the widespread integration of its reporting framework within regular company annual reports.<sup>1</sup> Arguably, CSR's increased popularity inside boardrooms has outpaced the research needed to justify it.<sup>2</sup> No longer necessarily viewed outside the profit maximizing framework, many questions still remain on how CSR policies affect the risks firms are facing and the stock market implications of those policies (Bénabou and Tirole, 2010, and Starks, 2009).<sup>3</sup> In this paper, we aim to address these issues by proposing a theory of how CSR affects firms' systematic risk and market value. We follow then by providing empirical evidence supporting our proposed mechanism.

We develop an industry equilibrium model where firms make production and CSR investment decisions and embed this model within a standard asset pricing framework. Following an extensive marketing literature (see e.g. Luo and Bhattacharya, 2006, 2009), we model an investment in CSR as a mechanism to acquire customer loyalty. Greater customer loyalty takes the form of a less price elastic demand, which the firm uses to smooth out the effect of aggregate economic fluctuations. With this assumption, the model captures the widely held view in the marketing literature that a firm with a more loyal demand has profits that

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<sup>1</sup>Intel Corporation provides a good example of the GRI reporting framework. CSR forms a part of Intel's integrated value approach with quantitative metrics for its CSR policies. Intel's Corporate Responsibility Report for 2012 can be found at [http://csrreportbuilder.intel.com/PDFFiles/CSR\\_2012.\\_Full-Report.pdf](http://csrreportbuilder.intel.com/PDFFiles/CSR_2012._Full-Report.pdf)

<sup>2</sup>In 2008, the Economist wrote to attest to the popularity of CSR that "The CSR industry, as we have seen, is in rude health. 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."

<sup>3</sup>For example, Bénabou and Tirole (2010, p. 9) argue that: "Corporate social responsibility (CSR) is somewhat of a 'catch-all' phrase for an array of different concepts. An analysis of CSR must therefore clarify its exact meaning, and in particular the presumed impact of CSR on the cost of capital."

are relatively less sensitive to aggregate economic conditions than a firm with a less loyal demand. From the perspective of a risk averse investor, a firm facing a more loyal demand exhibits lower systematic risk and is valued more highly.

The benefit from CSR adoption as a risk management tool is a partial equilibrium effect that contrasts with an industry-equilibrium feedback effect. Greater customer loyalty gives CSR adopters higher operating profits per unit of revenue. This in turn leads more firms to adopt CSR policies and firms with higher adoption costs implement CSR policies as well. These higher adoption costs increase operating leverage and lead to increasing systematic risk for the marginal firm.

We show that the relative strength of these two effects, and thus the relative riskiness of CSR firms, depends on the representative consumer's expenditure share on CSR goods. A sufficiently small expenditure share on CSR limits the proportion of CSR firms and implies that the marginal CSR firm has a lower systematic risk and a higher valuation than non-CSR firms. Therefore, the two main model predictions are that high-CSR firms have lower systematic risk and higher firm values. Moreover, since lower systematic risk is associated with lower co-movement of net profits with aggregate economic conditions, the model predicts that the ratio of net profits of CSR firms relative to that of non-CSR firms decreases in economic expansions.

The industry equilibrium of the model also allows us to study the effects of CSR adoption across industries. These additional predictions are important indirect tests of the model's hypothesis that CSR helps build customer loyalty. The model predicts that industries with greater product differentiation have a stronger CSR-risk relation, and that industries with a larger consumer's expenditure share on CSR goods have a weaker CSR-risk relation. This second prediction is somewhat surprising and is explained by the fact that increased spending in CSR results in the marginal CSR firm having higher adoption costs, higher operating leverage and systematic risk. The opposite occurs for non-CSR firms at the same

time: fewer firms produce with non-CSR technologies and with less competition these firms obtain higher profit margins, lowering their operating leverage and systematic risk.

We test the model predictions using a comprehensive dataset on firm-level CSR from MSCI's Environmental, Social and Governance (ESG) database. The sample consists of a panel of U.S. firms spanning the years from 2003 to 2011 with a total 23,803 firm-year observations. From ESG we obtain a firm-level CSR score that aggregates six different ratings attributes: community, diversity, employee relations, environment, product, and human rights. ESG also includes a governance attribute. To separate our analysis from studies that focus on governance related topics, our main results exclude the governance attribute from the firm's aggregate CSR score, but we also show the result of including the governance attribute with all other CSR attributes. We estimate firm systematic risk using a three factor model of returns and, following our model, take firm beta to be the coefficient on the market return. We run panel regressions with firm and year fixed effects, and with and without 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 reduces firm beta on average by 0.036, which represents a 4% decline in systematic risk relative to the sample mean 0.914. This effect does not appear to be caused by any single CSR attribute though the attributes diversity and environment have the largest economic impact whereas the attributes product and governance have a statistically insignificant impact. We then estimate the effect of CSR on systematic risk year by year and show that CSR exhibits a significantly negative impact on firm beta every year except for the years 2003 and 2009, when the impact of CSR is negative but insignificantly different from zero. Consistent with the risk mechanism in our model and the customer loyalty assumption, we also provide evidence that the ratio of CSR firms' profits to non-CSR firms' profits is negatively related to GDP growth.

Next, we find evidence supportive of the prediction that the effect of CSR on firm beta is stronger in industries with greater product differentiation. We use two measures of product differentiation. One measure is a dummy variable that takes the value of one if the firm operates in a differentiated goods industry as defined by Giannetti et al. (2011). Another measure is the continuous, firm-level product similarity variable developed in Hoberg and Phillips (2010). We find that the economic magnitude of the effect of CSR on firm beta is 34% higher in differentiated goods industries and 46% higher in firms with zero product similarity as compared to the sample mean of product similarity. We also find evidence supportive of the prediction that industries with a larger expenditure share on CSR goods have a weaker CSR-risk relation. In our model, increased consumer spending in CSR translates into a relatively larger number of firms that adopt CSR policies in an industry and increases the relative valuation of these firms. We therefore test whether the stock market capitalization of the higher-rated CSR firms is associated with a smaller difference in firm betas across CSR and non-CSR firms within an industry. We find that in industries where the top CSR firms have a higher relative market capitalization, the impact of CSR on beta is reduced, consistent with the model.

We find that higher CSR score has a positive impact on Tobin's Q. A one standard deviation increase in CSR score increases firm value by 0.136, equivalent to 7.07% of the sample mean of Tobin's Q of 1.927. Consistent with the model, this effect is larger for firms that produce differentiated goods. In addition, the impact of CSR on firm value is lower when top CSR firms have higher market capitalization.

Endogeneity is a major concern in the existing CSR literature, because it may be that a firm's financial performance is a determinant in its CSR decisions. Alternatively, more in the spirit of our story, firms that build customer loyalty through branding, and thus have lower systematic risk, might also do more CSR. In order to address these concerns, we run our tests with a comprehensive set of control variables. In addition, we address endogeneity

concerns by employing two novel sets of instruments for CSR. The first instrument is based on political affiliation of the state where the company is headquartered. As shown by Di Giuli and Kostovetsky (2012), firms headquartered in Democratic-leaning states are more likely to spend more resources on CSR. However, the political affiliation of a state should be unrelated to systematic risk and firm value.

The second instrument is based on a sample of product recalls, and environmental and engineering disasters. We argue that these are good instruments because MSCI's construction of the CSR score relies on some of the same information. In addition, the perception of CSR is likely to decrease following a disaster and, while the likelihood of disasters may lead to increases in idiosyncratic risk and lower firm value, for example due to the risk of law suits, it is unlikely that firm beta is related to these exogenous incidents. In our tests, we cannot reject that both of these sets of instruments are exogenous. We find that when we use the political affiliation of the firm's state of headquarter as the instrument, the instrumented CSR is negatively related to systematic risk and positively related to firm value, as predicted. When we use product recalls and environmental and engineering disasters as the instrument, the instrumented CSR is negatively related to beta. The results from the instrumental variables approach yield higher economic significance effects than the results using ordinary least squares and provide strong support that CSR leads to lower systematic risk and higher valuations, not the other way around. We deem these results to be one of our main contributions.

We organize the rest of the paper as follows. Section 2 reviews the existing literature. Section 3 presents the model and derives its equilibrium. Section 4 analyzes the equilibrium properties regarding risk and firm value. Section 5 presents the data used in our empirical tests and Section 6 presents the results. Section 7 concludes the paper. Proofs are relegated to the appendix as is an extension of the model to an infinite horizon setting.

## 2 Related Literature

A growing literature asserts that firms engage in profit maximizing CSR (e.g., Baron, 2001, and McWilliams and Siegel, 2001). According to the profit maximizing view, firms undertake CSR activities because they expect a net benefit from them.<sup>4</sup> Our paper fits into a line of research whereby profit maximizing CSR is a product differentiation strategy to gain competitive advantage over one's rivals (see Navarro, 1988, Webb, 1996, Bagnoli and Watts, 2003, and Siegel and Vitalino, 2007).<sup>5</sup> There is empirical evidence supporting the conjecture that CSR policies affect consumer behavior. Creyer (1997) shows that corporate ethical behavior affects positively consumers' purchase intentions. Auger et al. (2003) and Pelsmacker et al. (2005) document consumer willingness to pay for ethical product features. Ailawadi et al. (2011) provide evidence that in a retail setting, consumers are willing to pay for product and employee related intrinsic CSR activities, but not for extrinsic CSR activities such as environmental and social programs. Elfenbein and McManus (2010) and Elfenbein et al. (2012) show using data from eBay auctions that customers pay more for products sold through charity auctions, than those in non-charity auctions, and have fewer complaints among charity-intensive sellers.

CSR has received scant attention in theoretical finance literature. A notable exception is Heinkel et al. (2001), who assume that some investors choose not to invest in non-CSR stocks. This market segmentation leads to higher expected returns for non-CSR stocks, which must be held by only a fraction of the investors (as in Errunza and Losq, 1985, and Merton, 1987). In addition, Barnea et al. (2009) derive a model where ethical investors increase the value for CSR stocks and firms respond by choosing endogenously their level

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<sup>4</sup>According to Bénabou and Tirole (2010), the other motivations for CSR policies are delegated philanthropy and agency costs. In delegated philanthropy stakeholders delegate social activities they would like to do themselves to corporations. With agency costs, managers engage in CSR activities because they receive private benefits from them.

<sup>5</sup>In an international survey of CEOs, Hopkins and Cowe (2004) report that 79% of respondents say that CSR is necessary to maintain a competitive advantage.

of CSR spending. Gollier and Pouget (2012) build a model where socially responsible investors can take over non-CSR companies and create value by turning those into CSR companies. All these papers assume that there is a class of investors who prefer to invest in CSR stocks. However, as pointed out by Starks (2009), investors seem to care more about corporate governance than CSR. In contrast, our paper does not assume that investors care about CSR and instead focuses on the role of consumers and their actions, based on their perceptions of corporate responsible policies.

There is some recent empirical literature that documents a link between CSR, systematic risk and cost of equity capital. Sharfman and Fernando (2008) show that firm-level environmental performance is negatively associated with systematic risk resulting in lower cost of equity capital. Their sample size is small (270 firms) and is only cross-sectional. Using a panel data set of S&P 500 firms, Oikonomou et al. (2012) confirm that CSR is negatively related to systematic risk, in particular that social irresponsibility (CSR concerns) is associated with higher systematic risk. El Ghouli et al. (2011), calculating an *ex-ante* measure for cost of equity that utilizes analysts estimates, find that firms with higher CSR scores exhibit lower cost of capital.

Our paper is also related to the empirical literature on the association of CSR and firm value or shareholder wealth. Margolis et al. (2009) review the older empirical evidence and show that there is on average a small positive effect. Galema et al. (2008) provide evidence that CSR stocks have lower book-to-market ratios, i.e. that CSR stocks exhibit higher valuations. Gillan et al. (2010) show that environmental and governance scores are positively related to firm value, measured by Tobin's Q. CSR firms have also higher return on assets, due to lower operating expenses. Servaes and Tamayo (2012) provide evidence of positive association with CSR and firm value, but only for firms with high advertising expenditures. Using an event-studies approach, Fisher-Vanden and Thorburn (2011) find that when firms announce their membership in the Environmental Protection Agency's

Climate Leaders, a program intended to reduce greenhouse gas emissions, the announcement is met with negative abnormal returns. Like Fisher-Vanden and Thorburn, Krüger (2012) shows, in a larger sample of CSR events, that unconditionally both negative and positive CSR news lead to a stock price decline. However, in Krüger's study, the wealth effect of positive CSR news depends on the motivation of the management: there is 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.<sup>6</sup> Dimson et al. (2012) analyze CSR activism conducted by a large institutional investor and show that, consistent with Krüger's study, positive engagements that lead to changes in firms' CSR policies are followed by positive abnormal returns.

Some papers study the stock market performance of CSR stocks. The evidence is mixed. Brammer et al. (2006) and Hong and Kacperczyk (2009) find that least socially desirable stocks have higher expected returns after controlling for risk. Becchetti and Ciciretti (2009) provide evidence that for CSR stocks there is no difference in buy-and-hold risk adjusted returns relative to the control sample. In contrast, Derwall et al. (2005) show that the most ecologically efficient firms experience higher expected returns that cannot be accounted for by risk factors and Kempf and Osthoff (2007) show that a strategy whereby they invest in the most socially responsible stocks and short sell the least socially responsible ones leads to positive abnormal returns.<sup>7</sup>

We contribute significantly and provide novel insights to the existing literature on CSR. First, our paper builds a model based on customer loyalty and employs a standard consumption based asset pricing model embedded in an industry equilibrium model. Thus,

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<sup>6</sup>Cheng et al. (2013) provide evidence that increase in after-tax effective managerial ownership leads to decrease in CSR activities. This is a marginal effect and does not show that on average CSR activities are due to agency costs.

<sup>7</sup>There is also a literature examining the performance of socially responsible mutual funds. Geczy et al. (2003) show the cost of restricting investments to socially responsible funds is small, but that this cost is significant when size, value and momentum factors are controlled for. Renneboog et al. (2008) show that socially responsible mutual funds underperform their benchmarks, though by not more than conventional mutual funds, except for a small number of countries.

we provide a novel theoretical justification for the existing empirical findings. Second, we derive new testable implications (namely, that the effect of CSR on systematic risk is larger for firms producing differentiated goods, that the effect is weaker when consumers' expenditure share on CSR goods is higher, and that the ratio of CSR profits to non-CSR profits is countercyclical) and find empirical support for these implications. Third, we utilize a larger data set than previous studies and control for other possible effects carefully. Fourth, we consider the possibility of reverse causality and construct instruments for CSR that can help us mitigate the endogeneity concern.

Lastly, our paper is related to the work on brand assets and firm risk, since both branding and CSR affect consumer behavior. Rego et al. (2009) find a negative relation between a firm's brand equity, measured by consumers brand beliefs that affect purchase behavior, and firm risk. Brand equity has a negative impact especially on idiosyncratic risk, but also protects shareholders from systematic risk. Belo et al. (2011) find that firms with higher investments in brand capital, measured by advertising expenditures, exhibit lower stock returns compared to firms with lower investments in brand capital. The reason is that firms that invest more in brand capital are also the most productive firms with low systematic risk. In our empirical tests, we show that the effect of CSR on systematic risk is robust to controlling for advertising expenditures. Thus, we can conclude that CSR has an independent role in affecting firm risk.

### **3 The Model**

#### **3.1 The model setup**

Consider an economy where production, asset allocation, and consumption decisions are made over two dates, 1 and 2. There is a representative investor and a continuum of firms with unit mass. For generality, we present an extension to infinite horizon in the Appendix.

**Household sector:** The representative investor has preferences defined over lifetime consumption

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

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  $E[\cdot]$ .

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).<sup>8</sup> 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  $c_j = c_G, c_P$  goods. A lower elasticity of substitution implies lower price elasticity of demand and a more “loyal” demand. We therefore are interested in the case  $\sigma_G < \sigma_P$ . This mathematical formulation of demand loyalty captures two important dimensions of consumer behavior: consumers that actively seek out firms they see as being good at CSR and consumers that respond negatively to businesses that fall below expected ethical standards (e.g. Creyer, 1997). The parameter  $\alpha$  is the share of expenditure allocated to CSR goods in the industry and is exogenous. In the context of our representative agent model,  $\alpha$  captures the size of the market for CSR goods. The variable  $\mu$  measures the fraction of CSR firms in the economy and will be determined in equilibrium.

Investor optimization is subject to two single-period budget constraints. At date 1, the

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<sup>8</sup>The marketing literature provides evidence supportive of a positive association between customer loyalty and CSR (Creyer 1997, Auger et al., 2003, Pelsmacker et al., 2005, among others). See also Luo and Bhattacharya (2006, 2009).

investor is endowed with stocks and with cash  $W_1 > 0$  expressed in units of the aggregate good, which can be used for consumption and investment. 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,

$$\int_0^1 Q_i di + W_1 \geq C_1 + \int_0^1 Q_i D_i di + B, \quad (2)$$

and given the stock prices  $Q_i$  and the interest rate  $r$ . The presence of  $\int_0^1 Q_i di$  on the left hand side of the budget constraint (2) indicates, as is usual in models with a representative investor, that the representative investor is both the seller and the buyer of stocks.

The investor decides on the date 2 consumption of the various goods  $c_i$ , subject to the date 2 budget constraint:

$$W_2 \equiv \int D_i (\pi_i - B_i (1 + r)) di + wL + B (1 + r) \geq \int p_i c_i di. \quad (3)$$

In the budget constraint,  $\pi_i$  is the operating profit generated by firm  $i$  and  $B_i (1 + r)$  is the debt repayment by firm  $i$  so that  $\pi_i - B_i (1 + r)$  is the net profit, and in this two-period model it is also a liquidating dividend.  $W_2$  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  $f_{G_i}$  if it chooses to invest in the CSR technology or a cost  $f_P > 0$  if it chooses the non-CSR technology. The distribution of costs  $f_{G_i}$  across firms is a uniform that takes values between 0 and 1. Firm  $i$  finances  $f_i$  by raising debt  $B_i$  and therefore has zero cash flow at date 1.

Note that a higher cost  $f_{G_i}$  does not translate into a higher benefit for CSR firms. Instead, all CSR firms have access to the same elasticity of substitution,  $\sigma_G$ , independently

of their fixed cost of investment. This assumption captures the idea that CSR adoption is not equally costly to all firms.<sup>9</sup> Technically, it introduces decreasing returns to CSR at the industry level, which helps in the derivation of equilibria with interior values for  $\mu$ .

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

$$\pi_i = \max_{x_i} \{p_i(x_i) x_i - w l_i\}, \quad (4)$$

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

$$l_i = A^{\eta_i} \kappa_i x_i. \quad (5)$$

Production of one unit of output requires  $A^{\eta_i} \kappa_i$  units of labor input.  $\eta_i$  measures the sensitivity of firm  $i$ 's labor to the productivity shock  $A$  and  $\kappa_i$  measures the resource intensity of each technology. We make no assumption regarding the relative magnitudes of  $\eta_G$  and  $\eta_P$  and of  $\kappa_G$  and  $\kappa_P$ , though some views of CSR might be associated with the assumptions that CSR firms foster employee loyalty, i.e.,  $\eta_G < \eta_P$ , or are more resource intensive, i.e.,  $\kappa_G > \kappa_P$ .

The economy is subject to an aggregate productivity shock,  $A$ , realized at date 2 before production takes place. The productivity shock changes the number of labor units needed to produce consumption goods. High aggregate productivity is characterized by low values of  $A$ . The productivity shock  $A$  is assumed to have bounded support in the positive real numbers.

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<sup>9</sup>There are several reasons why fixed costs of adopting CSR technologies may differ between firms. For example, costs of converting to organic farming may depend on past chemical use; younger firms, using newer and cleaner technologies, may have lower costs of adopting additional green measures and targets relative to older firms that may be more likely to use older and more polluting legacy technologies; government subsidies may help promote the use of alternative energies and firms with stronger R&D teams may be better positioned to take advantage of these subsidies; and firms with higher quality corporate governance may have better organizational capabilities of adopting green technologies (Amore and Bannedsen, 2013).

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

### 3.2 Equilibrium

We start by solving the equilibrium at date 2.

**Date-2 equilibrium:** Let  $\mu \in (0, 1)$  denote the fraction of CSR firms. The outcome of the date-2 equilibrium is given as a function of the value of  $\mu$  which is solved for in the date-1 equilibrium.

Consider the consumer's problem. Let  $\lambda$  denote the Lagrange multiplier associated with the date-2 budget constraint (3). The first order condition for each CSR good  $c_l$  is

$$\alpha C_2^{-\gamma} \left( \int_0^\mu c_i^{\sigma_G} di \right)^{\frac{\alpha}{\sigma_G} - 1} \left( \int_\mu^1 c_i^{\sigma_P} di \right)^{\frac{1-\alpha}{\sigma_P}} c_l^{\sigma_G - 1} = \lambda p_l. \quad (6)$$

There is a similar condition for each non-CSR good. Multiplying both sides of each first order condition by the respective  $c_j$  and integrating over the relevant range gives

$$\alpha C_2^{1-\gamma} = \lambda \int_0^\mu p_i c_i di, \quad (7)$$

and

$$(1 - \alpha) C_2^{1-\gamma} = \lambda \int_\mu^1 p_j c_j dj. \quad (8)$$

By taking the ratio of these two conditions, it is straightforward to see that the parameter  $\alpha$  gives the expenditure share of CSR goods. The appendix provides the remaining steps that allow us to solve for the demand functions,

$$c_l = \alpha \frac{p_l^{\frac{1}{\sigma_G - 1}}}{\int_0^\mu p_i^{\frac{1}{\sigma_G - 1}} di} W_2, \quad (9)$$

$$c_k = (1 - \alpha) \frac{p_k^{\frac{1}{\sigma_P - 1}}}{\int_\mu^1 p_i^{\frac{1}{\sigma_P - 1}} di} W_2, \quad (10)$$

for CSR and non-CSR goods, respectively. Firm  $j$ 's demand elasticity equals  $-\frac{1}{1-\sigma_j}$ . Thus, a lower elasticity of substitution (lower  $\sigma_j$ ) is associated with a demand that is less sensitive to price fluctuations and is therefore more loyal.

It remains to find the value of  $\lambda$  as a function of goods prices and date 2 wealth. Adding up (7) and (8) gives  $C_2^{1-\gamma} = \lambda W_2$ . Finally, replacing the demand functions into the consumption aggregator gives the value of  $\lambda$ .

We now turn to the firms' problem. Each firm acts as a monopolistic competitor and chooses  $x_i$  according to equation (4). The first order conditions are:

$$\begin{aligned}\sigma_G p_l &= w A^{\eta_l} \kappa_l, \\ \sigma_P p_k &= w A^{\eta_k} \kappa_k.\end{aligned}$$

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,

$$\pi_j = (1 - \sigma_j) p_j x_j. \quad (11)$$

Goods with lower elasticity of substitution  $\sigma_j$ , i.e. goods with more loyal demand, allow producers to extract higher profits per unit of revenue, all else equal.

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 the following 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 for the marginal utility of date-2 wealth with constant relative risk aversion preferences,  $\lambda = C_2^{-\gamma}$ . The next proposition describes the date-2 equilibrium as a function of  $\mu$ . The proof is relegated to the Appendix.

**Proposition 1** *For any interior value of  $\mu$  and any aggregate shock  $A$ , a symmetric date-2 equilibrium exists and is unique with goods prices,*

$$\begin{aligned} p_G &= \bar{p} A^{(1-\alpha)(\eta_G - \eta_P)} \frac{\sigma_P \kappa_G}{\sigma_G \kappa_P}, \\ p_P &= \bar{p} A^{-\alpha(\eta_G - \eta_P)}, \end{aligned}$$

*consumption,*

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

*wage rate,*

$$w = \bar{p} A^{-\bar{\eta}} \frac{\sigma_P}{\kappa_P},$$

*operating profits,*

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

*and marginal utility of wealth,*

$$\lambda = [\bar{p} \bar{x}]^{-\gamma} A^{\gamma \bar{\eta}},$$

where  $\bar{p}, \bar{x} > 0$  are functions of exogenous parameters given in the Appendix, and  $\bar{\eta} = (1 - \alpha) \eta_P + \alpha \eta_G$ .

In equilibrium, a higher productivity shock (lower  $A$ ) increases the demand for labor and thus also increases the wage rate. The sensitivity of the wage rate to the productivity shock is given by the weighted average of the sensitivities,  $\bar{\eta}$ , where the weights are the expenditure shares. Prices of goods increase or decrease in response to a productivity shock depending on which types of goods are more sensitive to the productivity shock, as given by  $\eta_G - \eta_P$ . When  $\eta_G - \eta_P < 0$ , the production of non-CSR goods increases in expansions

as unit labor costs decrease more for those firms, leading to an increase in the relative price of CSR goods. The opposite occurs if  $\eta_G - \eta_P > 0$ . While the relative price of CSR goods depends on the sign of  $\eta_G - \eta_P$ , operating profits for both firm types,  $\pi_i$ , and the marginal utility of date-2 wealth,  $\lambda$ , depend only upon the weighted average of the sensitivities,  $\bar{\eta}$ .

**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:

$$m \equiv \delta \left( \frac{C_2}{C_1} \right)^{-\gamma} = \bar{m} [\bar{p}\bar{x}]^{-\gamma} A^{\gamma\bar{\eta}}, \quad (12)$$

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

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

$$1 = E[m(1+r)], \quad (13)$$

and stocks,

$$Q_i = E[m\pi_i] - f_i. \quad (14)$$

In equilibrium, if there is an interior solution for  $\mu$ , then  $Q_j \geq 0$  and the price of the marginal CSR firm,  $Q_G^*$ , obeys

$$Q_P = Q_G^*.$$

This equality determines the cut-off  $f_G^*$  by imposing that the marginal firm be indifferent between investing or not investing in CSR:

$$E[m\pi_G] - f_G^* = E[m\pi_P] - f_P. \quad (15)$$

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

Existence of date-1 equilibrium for  $\mu$  cannot be proved analytically.<sup>10</sup> However, the following proposition offers a characterization of the solution when an equilibrium exists. The proposition states that the proportion of CSR firms,  $\mu$ , is related to the expenditure share of CSR goods.

**Proposition 2** *At an interior equilibrium for  $\mu$ , the proportion of CSR firms in the industry  $\mu < f_P$  if, and only if,  $\alpha < \bar{\alpha}$ , where*

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

*Moreover, the constant  $\bar{\alpha}$  is increasing in  $\sigma_G$  and  $\bar{\alpha} < f_P$  if, and only if,  $\sigma_P > \sigma_G$ .*

The constant  $\bar{\alpha}$  is the expenditure share at which  $\mu = f_P$ . Any expenditure share  $\alpha < \bar{\alpha}$  leads to a proportion  $\mu < f_P$ . A more loyal demand for CSR firms,  $\sigma_P > \sigma_G$ , implies that the threshold expenditure share  $\bar{\alpha} < f_P$ . Intuitively, when  $\sigma_P > \sigma_G$ , then CSR firms are able to extract higher rents for the same expenditure share  $\alpha$  and the proportion of CSR firms grows. To cap the fraction of firms at less than  $f_P$ , a sufficiently smaller expenditure share  $\alpha$  is required in equilibrium.

## 4 CSR and Risk in Equilibrium

In this section, we analyze the properties of CSR firms' risk and of the proportion of CSR firms in the industry. For simplicity, in what follows, 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  $j = P$ .

<sup>10</sup>We have verified existence of an interior equilibrium for  $\mu$  in numerical examples. That the mass of firms is bounded by 1 implies the possibility of an equilibrium with  $\mu = 0$  and  $Q_P > Q_G > 0$ . The constraint  $\mu \leq 1$  can be motivated by the existence of a fixed factor of production, e.g., land. However, the results are not sensitive to this assumption.

## 4.1 Profitability and aggregate shocks

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

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

This is a measure of a firm's operating leverage. Note that we compute the elasticity with respect to  $A^{-1}$  so that a high value of  $A^{-1}$  is associated with upturns and operating leverage is positive.

The sensitivity of firms' profits to aggregate shocks depends on the degree of customer loyalty. To see this, consider the partial equilibrium effect that increased customer loyalty (lower  $\sigma_j$ ) has on operating leverage holding  $\mu$  constant. The partial derivative of operating leverage with respect to  $\sigma_j$  is positive, implying that a firm with a more loyal demand (lower  $\sigma_j$ ) has profits that are less sensitive to aggregate shocks. The intuition for the result is that a more loyal demand generates greater profit margins for the firm, which dilute the effect of the fixed adoption costs and lower the firm's operating leverage. 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.

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:*

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

$R_\pi$  is increasing with  $A$  if, and only if,  $\alpha < \bar{\alpha}$ .

For a sufficiently small expenditure share in CSR,  $\alpha < \bar{\alpha}$ , or as shown in Proposition 2, for a sufficiently small size of the CSR market,  $\mu < f_P$ , the profits of CSR firms are less

sensitive to productivity shocks than those of non-CSR firms. That is, net profits of CSR firms decrease in recessions (high  $A$ ) but by less than the profits of non-CSR firms, and as a result  $R_\pi$  increases.

## 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 its net profits, or liquidating dividend, divided by the stock price,  $1 + r_j \equiv (\pi_j - f_j(1 + r))/Q_j$ . Using equations (13) and (14), we obtain the usual pricing condition in a consumption-CAPM model:

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

In this model, the expected excess return is a measure of systematic risk that is determined by the covariance of the stock return with the intertemporal marginal rate of substitution,  $Cov(m, r_j)$ . This covariance depends on how aggregate productivity affects both variables. In the Appendix, we prove that:

**Proposition 4** *Firm  $j$ 's equilibrium expected stock return in excess of the risk free rate is:*

$$E(r_j - r) = \frac{\bar{p}\bar{x}(1 - \sigma_j) \frac{\alpha_j}{\mu_j}}{\bar{m} [\bar{p}\bar{x}]^{1-\gamma} (1 - \sigma_j) \frac{\alpha_j}{\mu_j} E[A^{(\gamma-1)\bar{\eta}}] - f_j} \frac{-Cov(A^{-\bar{\eta}}, A^{\gamma\bar{\eta}})}{E(A^{\gamma\bar{\eta}})}. \quad (16)$$

*The expected excess return is increasing in  $\sigma_j$ . Furthermore, at an interior solution for  $\mu$ , the marginal CSR firm has*

$$E(r_P - r) > E(r_G^* - r) \text{ if, and only if, } \bar{\alpha} > \alpha.$$

The proposition gives an expression for firm  $j$ 's expected excess return. The first term in the expression is an operating leverage effect. It amplifies the term  $Cov(A^{-\bar{\eta}}, A^{\gamma\bar{\eta}})$  that

captures how profits co-vary with the stochastic discount factor. This covariance is negative for any risk aversion parameter  $\gamma > 0$  and thus  $E(r_j - r) > 0$ .<sup>11</sup>

The partial derivative of expected excess returns with respect to  $\sigma_j$  describes the impact of changes in demand loyalty. Holding  $\mu$  constant,  $E(r_j - r)$  increases with  $\sigma_j$ . Intuitively, increased loyalty (lower  $\sigma_j$ ) reduces the sensitivity of the firm's net profits to aggregate shocks. Such a firm pays a relatively higher dividend in states of lower consumption and high marginal utility and is therefore less risky to a risk averse investor and worth more. Thus, the model translates the view regarding how net profits change over the business cycle for firms with more loyal demand to a statement about systematic risk.

The more loyal demand, by increasing firm profits and stock prices, produces a feedback equilibrium effect via an increase in the proportion of CSR firms,  $\mu$ . 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  $\mu \leq f_P$  (or  $\alpha \leq \bar{\alpha}$ ) then the marginal CSR firm has  $E(r_G^* - r) \leq E(r_P - r)$ . In this case, infra-marginal CSR firms also have higher prices and lower expected returns than non-CSR firms. Therefore, if  $\mu \leq f_P$ , then on average CSR firms have lower expected excess returns. When  $\mu > f_P$  (or  $\alpha > \bar{\alpha}$ ), then  $E(r_P - r) < E(r_G^* - r)$  and the marginal CSR firm has higher fixed adoption costs, operating leverage and systematic risk than non-CSR firms. By continuity, infra-marginal firms with fixed costs close to  $f_G^* = \mu$  also have higher expected returns, but there may be firms with low enough  $f_{G_i}$  such that  $E(r_P - r) > E(r_{G_i} - r)$ .

Systematic risk can also be measured with respect to the market return. Define the value-weighted market return as  $1 + r_M \equiv \int (\pi_i - f_i(1 + r)) di / \int Q_i di$ .

**Proposition 5** *Consider firm  $j$ 's market  $\beta_j = Cov(r_j, r_M) / Var(r_M)$ . We have,*

$$\beta_j = \frac{(1 - \sigma_j) \alpha_j}{(1 - \sigma_G) \alpha + (1 - \sigma_P)(1 - \alpha)} \frac{\int Q_i di}{\mu_j Q_j}.$$

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<sup>11</sup>If investors are risk neutral, i.e.,  $\gamma = 0$ , then  $E(r_j - r) = 0$ , that is, there is no priced risk.

At an interior solution for  $\mu$ ,  $\beta_P > \beta_G^*$  if, and only if,  $\bar{\alpha} > \alpha$ .

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.,  $\mu \leq f_P$  (or  $\alpha \leq \bar{\alpha}$ ). In such an equilibrium, the marginal CSR firm has lower  $\beta$  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  $\mu \leq f_P$ , then the average CSR firm has lower market  $\beta$  than the average non-CSR firm. Now consider an equilibrium where the fraction of CSR firms is sufficiently large, i.e.,  $\mu > f_P$ . When  $\mu > f_P$  (or  $\alpha > \bar{\alpha}$ ), the marginal CSR firm has higher market  $\beta$  than non-CSR firms. The reason is that when the proportion of CSR firms is larger, the marginal CSR firm has high fixed adoption costs and high operating leverage. Hence, high systematic risk.<sup>12</sup>

The next proposition indicates the determinants of *changes* in systematic risk for CSR and non-CSR firms. We are not able to derive general analytical results for firm-level betas but only for average betas. We therefore construct the weighted average market  $\beta$  of CSR firms,  $\bar{\beta}_G \equiv \int_0^\mu \beta_j \frac{Q_j}{\int Q_i di} dj$ ,

$$\bar{\beta}_G = \frac{(1 - \sigma_G) \alpha}{(1 - \sigma_G) \alpha + (1 - \sigma_P) (1 - \alpha)}. \quad (17)$$

The weighted average market  $\beta$  of non-CSR firms is  $\bar{\beta}_P = 1 - \bar{\beta}_G$ . Clearly, if a determinant leads to lower betas for CSR firms, it must lead to higher betas for non-CSR firms. Alternatively, if  $\bar{\beta}_G < \bar{\beta}_P$  and if a determinant leads to lower betas for CSR firms, then the gap between  $\bar{\beta}_G$  and  $\bar{\beta}_P$  widens.

Straightforward differentiation of expression (17) yields:

**Proposition 6** *The weighted average market  $\beta$  of CSR firms decreases with:*

1) *lower elasticity of substitution in the industry (decrease in  $\sigma_G$  and  $\sigma_P$ , keeping  $\sigma_P - \sigma_G$  constant); and,*

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<sup>12</sup>Idiosyncratic volatility is zero in the model because we allow for only one source of uncertainty, which is aggregate in nature.

2) lower expenditure share for CSR goods (decrease in  $\alpha$ ).

Together, Propositions 5 and 6 imply that if firm-level beta for CSR firms is lower than for non-CSR firms in two industries, then that difference is larger in the industry with lower elasticity of substitution across goods, and in the industry with a lower expenditure share for CSR goods.

### 4.3 Testable Predictions

In this subsection, we collect the model predictions discussed above. The first main model prediction is obtained from Proposition 5.

**Prediction 1** Firm-level CSR is associated with lower firm-level systematic risk.

We test this prediction using the sign and the significance of the slope coefficient on a regression of firm-level systematic risk on the firm's CSR attributes. In this regression, we control for known determinants of systematic risk. In addition, we control for measures of customer loyalty that relate to advertising to emphasize that our effect is not driven by CSR proxying for that.

In next prediction, we emphasize the aspect of the model that relates to the degree of substitutability across goods, which is used to construct our model of customer loyalty. The prediction arises directly from Proposition 6. We use measures of product and industry differentiation and assume that greater differentiation is a proxy for lower elasticity of substitution.

**Prediction 2** Firm-level CSR is associated with lower firm-level systematic risk, particularly with greater product differentiation.

While our model predictions build on the notion of customer loyalty, we do not differentiate between consumer industries and business-to-business industries in testing our

model. The main reason is that 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, from the firms that supply to these firms, and so on. For example, Fortune magazine recently quoted Ma Jun, a noted Chinese environmental activist, about Apple's turnaround in their sustainability policies and their efforts motivating key suppliers ("Apple does a 180 with suppliers in China", June 2013). This distinguishing feature of CSR is likely to be critical to identify its effects vis-à-vis other ways that firms use to acquire customer loyalty, such as advertising.

The third main model prediction is also obtained from Proposition 6. Strictly speaking, the proposition says that the CSR-risk relation is weaker in industries where the expenditure share of CSR goods is higher. Intuitively, when consumers spend more on CSR goods, then CSR firms capture a greater share of the market and have higher profit margins. This in turn leads more firms to adopt CSR policies, attracting firms with higher adoption costs. These higher adoption costs increase operating leverage and systematic risk. This prediction captures the idea of decreasing returns to CSR. In the absence of an industry panel of data on CSR expenditure shares, we restate the result in Proposition 6 in terms of the stock market capitalization of the higher-rated CSR firms. In the model, industries with higher CSR expenditure shares have higher relative market capitalization for CSR firms. Thus,

**Prediction 3** Firm-level CSR is associated with lower firm-level systematic risk, but the effect is weaker in industries with higher relative market capitalization of CSR firms.

The next prediction is obtained from Proposition 3. This proposition describes how the ratio of CSR profits to non-CSR profits co-moves with aggregate productivity shocks, which are the sole driver of business cycle fluctuations in the model. If CSR firms are less risky than non-CSR firms, then the model predicts that their net profits do not increase as much as those of non-CSR firms in economic upturns. Formally:

**Prediction 4** The ratio of CSR firm profits relative to non-CSR firm profits decreases in business cycle expansions.

It is interesting to contrast this prediction with the prediction from the alternative view that CSR goods are superior goods. Under this alternative view, CSR firms' profits should co-move more with the business cycle, increasing at a faster pace with improving economic conditions than non-CSR firms' profits. This would also make CSR firms riskier.

The last prediction is about the valuations of CSR versus non-CSR firms. In equilibrium  $Q_P = Q_G^*$ , so that firm values are equal for the marginal CSR firm and all non-CSR firms. Recall that the firm value for the marginal CSR firm is  $Q_G^* = E(m\pi_G) - f_G^*$ . Because infra-marginal CSR firms have lower fixed costs of adopting the CSR technology, the net benefits of CSR adoption are higher for those firms. Thus the firm values have to be higher for the infra-marginal firms, i.e.  $Q_{Gi} = E(m\pi_G) - f_{Gi} \geq Q_G^* = Q_P$ . Therefore,

**Prediction 5** Firm-level CSR is associated with higher firm value.

## 5 Data Description

We obtain firm-level CSR data from 2003 to 2011 from the MSCI's ESG (Environmental, Social and Governance) database, formerly known as KLD Research & Analytics.<sup>13</sup> ESG ratings aim to identify social and environmental risk factors that may affect a firm's financial performance and its management of risk. A detailed description of the data is provided in Table A.I in the Appendix. Firms are rated on a variety of strengths and weaknesses on seven attributes: community, diversity, employee relations, environment, product, human rights, and governance. For every attribute, we compute a firm-level score as the difference between its strengths and weaknesses and define seven corresponding variables: community, diversity, employee, environment, product, human, and governance. We construct a measure

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<sup>13</sup>MSCI ESG coverage for years prior to 2003 is reduced to about 1,100 firms in 2001 and 2002, and to 650 firms before 2001.

of aggregate corporate social responsibility (CSR) by adding the scores of the first six attributes. In our main results, we exclude governance from the aggregate CSR score to focus on non-governance aspects of CSR. Our results remain robust if governance is included as part of the aggregate CSR score.

Panel A of Table I reports summary statistics for each of the CSR attributes and also for the aggregate CSR score. The aggregate CSR score ranges from -9 to 18 and displays greater variance than the sum of the variances of the individual attributes, because the individual attributes are positively correlated. Panel B of Table I reports the distribution of companies covered by the ESG score over time and a breakdown by year of the mean value of the scores in each attribute. For every year, the data contain about 2,600 publicly listed U.S. companies. In total, the sample has 23,803 firm-year observations from 4,462 distinct companies.<sup>14</sup> There is some time series variation even in mean values that we explore in some of our tests.

In addition to rating firms on the various CSR attributes, MSCI identifies six “sin” concerns, or controversial business issues: firearms, gambling, military, nuclear, tobacco, and alcohol. The sin dummy variable takes the value of one if a firm has one of the sin concerns and 0 otherwise. We will use it as a control variable to account for the effect of “sin” stocks on firm risk (Hong and Kacperczyk, 2009).

**[Insert Table I here]**

We match social responsibility data with Compustat using CUSIPs as firm identifiers. We manually check stock ticker and company name for every data point to confirm that the matching is correct. Panel C of Table I reports the number of firms and average CSR score per industry. To conserve on space, we report in the table the statistics by one-digit

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<sup>14</sup>The sample we obtain from MSCI has 26,559 firm-year observations from 4,577 distinct companies from 2003 to 2011. After matching this sample with Compustat and CRSP and constructing our main variables, we end up with 23,803 firm-year observations.

SIC code and report here the top and bottom CSR industries by two-digit SIC code. The industries with highest CSR score are Hotels (SIC = 70) with an aggregate CSR score of 0.981, Credit Institutions (SIC = 61) with an aggregate CSR score of 0.804, and Printing and Publishing (SIC = 27) with a score of 0.489. The industries with lowest CSR scores are Coal Mining (SIC = 12) with a CSR score of -3.309, Petroleum Refining (SIC = 29) with a score of -2.413, and Agricultural Production Crops (SIC = 1) with a score of -1.897.

Table II reports pairwise correlation coefficients between the aggregate CSR score, its various attributes, and the sin dummy variable. Most CSR attributes are positively correlated with other attributes except for the product and human attributes that are negatively correlated with the attributes community and diversity. The product score covers such things as antitrust and access to capital and the human score covers concerns about business dealings in countries with poor human rights records. We interpret these negative correlations as reflecting the many facets of CSR. The sin dummy is negatively correlated with the aggregate CSR score and with each of the CSR attributes, except for diversity. This is somewhat surprising as we expected that these firms would compensate for their controversial business issues by building up other aspects of CSR.

**[Insert Table II here]**

We match these data with stock return data from CRSP in order to obtain an estimate of systematic risk. To construct an estimate of systematic risk that better proxies for our model's main variable, we run a market model regression that accounts for known empirical asset pricing regularities: the Fama-French factors and a correction for short-run autocorrelation in market returns (e.g., Scholes and Williams, 1977).<sup>15</sup> Our estimate of systematic risk,  $\beta_{it}$ , is obtained by running the following time-series regression for every

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<sup>15</sup>Our main results are largely unaffected if we estimate  $\beta$  using a one factor market model.

stock  $i$  in year  $t$  using weekly data:

$$r_{i,s} - r_s = h_i + \beta_i^1 (r_{M,s} - r_s) + \beta_i^2 (r_{M,s-1} - r_{s-1}) + h_i^1 SMB_s + h_i^2 HML_s + \varepsilon_{i,s}, \quad (18)$$

where  $r_{i,s}$  is the weekly return for stock  $i$  at week  $s$ ,  $r_s$  is the one-month T-Bill rate at time  $s$  transformed into a weekly rate,  $r_{M,s}$  is the return on the CRSP value-weighted index at time  $s$ , and  $SMB_s$  and  $HML_s$  are the Fama-French factors at time  $s$ . We adjust the estimate of  $\beta$  for autocorrelation in market returns by including both current and lagged excess market returns in the regression. The value of systematic risk for stock  $i$  at year  $t$  used in subsequent analysis is,

$$\hat{\beta}_{it} = \frac{1}{2} (\hat{\beta}_i^1 + \hat{\beta}_i^2).$$

Finally, we match our data with Compustat. We calculate a measure of firm value, *Tobin's Q*, as the ratio of the market value of equity (fiscal year-end price times number of shares outstanding) plus book value of debt (total assets less book value of equity) to total assets. Table A.I in the Appendix provides a detailed description of the remaining variables used in the analysis and Table III provides summary statistics for these variables. To deal with outliers, all of the variables (except for the CSR score) are winsorized at the 1% and 99% levels. The results are robust if alternative outlier detection methods are used, such as Cook's D statistic.

**[Insert Table III here]**

In addition to these variables, we use the following variables in our tests. *Differentiated goods industries* dummy (24% of the sample) is taken from Giannetti et al. (2011). This dummy takes the value of 1 if the firm is in any of the following industries: furniture and fixture; printing and publishing; rubber and plastic products; stone, glass, and clay products; fabricated metal products; machinery; electrical equipment; transportation

equipment; instruments; and miscellaneous products. *Hoberg and Phillips product similarity* is a firm-level variable that is inversely related to product differentiation (Hoberg and Phillips, 2010). *Industry top-CSR market cap* is defined at the two-digit SIC industry as the market capitalization share of the top-third CSR firms relative to the industry’s market capitalization. *Profit ratio* is defined at the two-digit SIC industry as the ratio of the mean net income of the firms in the top-third CSR score to the mean net income of the firms in the bottom-third CSR score.

## 6 Empirical Results

### 6.1 Empirical Strategy

To test the model predictions, we run a variety of regressions using yearly data of firm-level  $\beta$  and *Tobin’s Q*. In these regressions, we control for factors that drive variation in the explained variable, including firm and year fixed effects, besides controlling for the main variable of interest, firm CSR. In firm-level regressions, we do not include industry fixed effects as these are likely to be absorbed by the firm fixed effects due to limited switching of firms between industries. We report two-dimensional clustered standard errors (see Petersen, 2009) in all cross-sectional tests, clustered by firms and years to adjust for arbitrary heteroskedasticity, cross-sectional, and time-series correlation.

The firm characteristics used as control variables in the systematic risk regressions are: *Operating leverage*; *R&D expenditures*; *Advertising expenditures*; financial leverage (*Leverage*); *CAPEX*; *Cash*; *Sales growth*; market equity-to-book (*ME*); *Size*; *Dividend yield*; *Earnings variability*; log of firm age (*Age*); and, *Diversification*. Leverage, sales growth, size, earnings variability, and the dividend yield have been shown to affect systematic risk by Beaver et al. (1970). McAlister et al. (2007) show that R&D expenditures and firm age have an impact on systematic risk. Melicher and Rush (1973) show that conglomerate firms have higher  $\beta$ s than stand-alone firms. Palazzo (2011) shows that firms with higher levels

of cash holdings display higher systematic risk. Novy-Marx (2011) shows that operating leverage predicts cross-sectional returns. A subset of these variables is used in the valuation regressions (see e.g. Durnev and Kim, 2005). They include Operating leverage, R&D expenditures, Advertising expenditures, Leverage, CAPEX, Sales growth, Size, Age, and Diversification. Our results are robust to inclusion of other control variables, for example governance factors such as institutional ownership.

## 6.2 Results

To test Prediction 1, we examine how CSR and its attributes are related to firm systematic risk. First, we run regressions with firm and year fixed effects but without firm-specific control variables. Table IV presents the results. Specification 1 shows that the level of systematic risk is statistically significantly lower for firms with higher aggregate CSR scores (coefficient of  $-0.0168$  with  $t$ -statistic of  $-6.14$ ). Economically, this effect is significant as well: an increase in CSR of one standard deviation of the sample CSR (equal to 2.162 from Table III) reduces  $\beta$  by  $0.0168 \times 2.162 = 0.036$ , which is a 4% decrease relative to the sample mean of systematic risk of 0.914 (from Table III).

Community, diversity, employee, environment and human attributes of CSR, when entered separately, also are negatively and statistically significantly linked to firm  $\beta$ . While the effect of CSR appears to not be driven by a single attribute, among the various attributes, diversity and environment have the strongest impact on firm systematic risk. A one standard deviation increase in each of these attributes decreases  $\beta$  by  $0.0199 \times 1.377 = 0.027$  and  $0.0312 \times 0.715 = 0.022$ , respectively. The governance attribute of CSR in MSCI's ESG is not related to  $\beta$  (specification 8), and the significance of CSR is preserved if the aggregate CSR score incorporates the governance component (specification 9).<sup>16</sup> By itself, the

<sup>16</sup>These results on the governance attribute are provided for completeness and do not necessarily contribute to the general literature on governance, because ESG's governance attribute differs from traditional governance metrics. For example, it does not contain information on the firm's anti-takeover provisions. It also contains information on activities that are not typically included in governance metrics, such as equity

sin dummy has no significant effect on firm systematic risk (specification 10) and firm CSR remains significant if the sin dummy is controlled for (specification 11).

Table V reports similar panel regressions where we control for several firm-level variables, besides the firm and year fixed effects already present in Table IV. Of the various controls, we highlight the inclusion of *Advertising* expenditures that also increase customer loyalty. If customer loyalty originated only through advertising, then we would not expect CSR to be related to risk. Likewise, if customer loyalty arises because of loyalty to the firm's technology (e.g., Apple or Microsoft), then controlling for *R&D*, *CAPEX* and *Sales growth* should help capture this additional channel. Specification 1 shows the results with control variables only. The control variables mostly display the expected signs: *Leverage*, *Cash*, *ME*, *Dividend yield*, and *Diversification* are positively related to systematic risk, whereas *R&D* is associated with lower systematic risk. The other controls, including *Advertising* expenditures and *Operating leverage*, are not significant across specifications.

In the remaining specifications of Table V, we include both a CSR proxy and the various controls. The presence of controls does not affect the level and significance of CSR and its attributes. Specifically, all of the CSR attributes, except for product, are significantly related to firm systematic risk again suggesting that the effect of CSR is not concentrated in a single attribute. Economically, improving CSR by one standard deviation decreases  $\beta$  by 3.7% relative to the mean sample value of  $\beta$  (obtained from  $-0.0158 \times 2.162/0.914$ ). The  $R^2$  of the regressions does not change noticeably from one specification to another and from Table IV to Table V because firm fixed effects absorb most of variation in  $\beta$ .<sup>17</sup> Note that in the model CSR has an effect on firm beta through the firm's operating leverage. Therefore, the inclusion of both variables, CSR and operating leverage, in the regression would be

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stakes in other firms having social concerns, or information about the firm's transparency record concerning its political involvement.

<sup>17</sup>We have also conducted the regressions in Table V with CSR strengths and CSR weaknesses entering separately as independent variables. We find that the coefficient on CSR strengths is estimated to be negative and significant, as expected. The coefficient on CSR weaknesses is positive, as expected, but not statistically different from zero.

misspecified under the null of the model if CSR were the only empirical determinant of operating leverage. However, CSR is probably not the only nor even the main determinant of operating leverage. Consistent with the model, we find that higher CSR firms have lower operating leverage (univariate correlation coefficient of  $-0.054$  with  $p$ -value of  $0.0$ , untabulated),<sup>18</sup> but the multivariate results in Table V suggest that operating leverage does not subsume the effect of CSR. Our interpretation is that changes in CSR are likely to lead to changes in operating leverage, but because many other variables also affect operating leverage, using CSR directly is a better approach to evaluating its impact in firm risk.

**[Insert Tables IV and V here]**

One potential alternative explanation for our finding is that firms spend more in CSR in economic expansions (as in the agency view of CSR) when risk tends to be lower. While we note that the effect of economic expansions on  $\beta$  should be captured by the year fixed effects, we further examine how the relation between firm systematic risk and CSR changes through time to alleviate this concern. We repeat the analysis by year, without controls as in Table IV and with controls as in Table V. The results are displayed in Table VI, panels A and B, respectively. We find that firms with higher CSR have significantly lower  $\beta$ s in most years in the sample, with uniformly high  $t$ -statistics, implying that our results are not unique to economic expansions. On the contrary, the years 2003 and especially 2009, where the model performs poorly, coincide with strong stock market recoveries.

**[Insert Table VI here]**

The results of testing Predictions 2 and 3 are displayed in Table VII. Prediction 2 states that firm-level CSR is associated with lower firm-level systematic risk, particularly

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<sup>18</sup>In the model  $\mu = f_G^*$ . Therefore, when  $\mu \leq f_P$  and CSR firms have lower  $\beta$ ,  $f_G^* \leq f_P$  and CSR firms also have lower operating leverage.

for differentiated goods. To test this prediction, we interact firm CSR with the *Differentiated goods industry* dummy and the *Hoberg-Phillips product similarity* variable (specifications 1 and 2 of Table VII, respectively). In specification 1, we drop firm fixed effects because they sum up to the industry dummy variable. In both specifications, the coefficients on the interaction terms have the predicted signs and are statistically significant. The impact (in absolute value) of CSR on firm risk goes up from 0.0181 when the *Differentiated goods industries* dummy is zero to 0.0242 when the firm belongs to a differentiated goods industry, an increase in economic significance of 34%. Likewise, the impact (in absolute value) of CSR on firm risk goes up from 0.0167 (equal to  $0.0243 - 0.0981 \times 0.0773$ ) for a firm with mean product similarity of 0.0773 (see Table III) to 0.0243 for a firm with zero product similarity, an increase in economic significance of 46%.

Prediction 3 states that firm-level CSR is associated with lower firm-level systematic risk, but the effect is weaker in industries with higher *Industry top-CSR market cap*. We find that firm CSR remains negative and significant with the coefficient of  $-0.0198$  and *t*-statistic of  $-4.60$  and that the coefficient of the interaction between *Industry top-CSR market cap* and firm CSR score is positive and significant, as expected. This evidence is consistent with the idea of decreasing returns to CSR.

Prediction 4 states that the ratio of CSR firm profits relative to non-CSR firm profits is counter-cyclical, decreasing (increasing) in economic expansions (contractions), that is, CSR net profits do not increase as much as those of non-CSR firms in economic upturns. To test this prediction, we construct, for each industry and for each year, the mean net income of the firms in the top-third CSR score divided by the mean net income of the firms in the bottom-third CSR score, called *Profit ratio*. Specification 4 in Table VII shows that the relation of *Profit ratio* and GDP growth expressed in 2003 dollars (as a proxy for economic cycles) is negative (coefficient of  $-0.122$ ) and statistically significant.<sup>19</sup> Therefore, the ratio

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<sup>19</sup>The regressions include industry fixed effects. Using median net income produces similar result. Further,

of profits decreases during the periods of relatively higher GDP growth.

[Insert Table VII here]

Finally, we test Prediction 5 that firm-level CSR is associated with higher firm valuation as measured by *Tobin's Q*. In Table VIII, we present the results of regressing *Tobin's Q* on: CSR (specification 1); CSR and its interaction with the *Differentiated goods industry* dummy (specification 2); CSR and its interaction with the *Hoberg-Phillips product similarity* variable (specification 3); and, CSR and its interaction with *Industry top-CSR market cap* (specification 4). We find that the effect of CSR score on *Tobin's Q* is positive and highly significant (coefficient of 0.0630 and *t*-statistic of 9.17) in the baseline specification, consistent with Prediction 5. A one standard deviation increase in CSR is associated with a 7.07% (equal to  $0.0630 \times 2.162/1.927$ ) increase in *Tobin's Q* relative to its sample average value of 1.927 (see Table III). We also find in specifications 2-4 that CSR is more strongly related to *Tobin's Q* with differentiated goods, consistent with the model (coefficient of CSR interacted with *Differentiated goods industry* dummy is 0.0253 with *t*-statistic of 3.25 and coefficient of CSR interacted with *Hoberg-Phillips product similarity* variable is  $-0.0801$  with *t*-statistic of 2.22). In terms of economic significance, the impact of CSR on firm value goes up from 0.0487 when the *Differentiated goods industries* dummy is zero to 0.074 when the firm belongs to a differentiated goods industry, an increase in economic significance of 52%. The impact of CSR on firm value goes up from 0.0419 (equal to  $0.0481 - 0.0801 \times 0.0773$ ) for a firm with mean product similarity of 0.0773 to 0.0481 for a firm with zero product similarity, an increase in economic significance of 15%.<sup>20</sup> Specification 5 shows that firm CSR increases *Tobin's Q* by less if a firm belongs to an industry with a larger share of top-CSR

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the results are not changed if we de-trend growth in GDP.

<sup>20</sup>We find that the coefficient on the *Differentiated goods industries* dummy is negative. Differentiated goods industries spend more money on advertising and R&D and those have a positive effect on valuation, so while the marginal effect of differentiation might be negative, the total effect of differentiation may still be positive.

market capitalization also consistent with the model (coefficient on the interaction term is  $-0.0092$  with  $t$ -statistic of  $-1.70$ ).

[Insert Table VIII here]

### 6.3 Endogeneity in the CSR-Risk and CSR-Valuation Relations

One concern with our analysis and in fact with most other studies of CSR is that of endogeneity, particularly for tests of Predictions 1 and 5. One cause of endogeneity, as stated by Waddock and Graves (1997), is the slack hypothesis. Hong et al. (2011) present evidence showing that financially constrained firms are less likely to spend resources on CSR and that when these firms' financial constraints are relaxed, spending on CSR also increases. Thus (exogenous) firm characteristics may lead to CSR, not the other way around. In our case, it could be that firms with low levels of systematic risk or firms with higher valuation have more resources to spend on CSR or have less growth options, so that they can afford to dedicate more resources to CSR. More in the spirit of our story, it may be that firms that traditionally build customer loyalty through advertising or other means, and have lower systematic risk, also do more CSR. In addition, firms with low level of systematic risk or higher valuation may even have certain management styles, or cater to certain groups of investors, or be in industries that are more prone to developing more aggressive CSR policies.

To alleviate these important 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 (partly) control for the slack hypothesis. When we control for *Advertising* and *R&D*, we control for the other types of investment in customer loyalty. In addition, firm fixed effects capture a great deal of unobserved firm characteristics that can be correlated with the error term and result in endogeneity.

Second, we deal with endogeneity by creating two novel sets of instruments for CSR. The first set of instruments follows Di Giuli and Kostovetsky (2012) who find that firms

headquartered in Democratic party-leaning states are more likely to spend resources on CSR.<sup>21</sup> At the same time, we expect that the political inclination of a state is unrelated to systematic risk and firm valuation. We use this set of instruments for systematic risk and valuation regressions. Note that political inclination of a state could be related to the geographic clustering of industries (see Almazan et al., 2010), and thus indirectly to firm systematic risk. However, since we include firm fixed-effects in our first-stage regression, and industry effects are captured by the firm fixed-effects, geographic clustering of industries should not be a concern.

The second set of instruments is based on an hand-collected sample of product recalls and environmental and engineering disasters. We argue that these are good instruments for firm  $\beta$  because (i) MSCI's construction of the CSR index relies on some of the same information, (ii) the perception of CSR is likely to decrease following a natural disaster, such as, an oil spill, or a product recall, and (iii) because the likelihood of these events may increase idiosyncratic risk and lower firm value, while it is unlikely that firm  $\beta$  is related to these exogenous incidents. Consequently, we use the disasters instrument only in the firm beta regressions.

We apply the Di Giuli and Kostovetsky's (2012) methodology to measure time-varying state-level political leaning toward the Democratic party. Accordingly, we expect that companies headquartered in more Democratic states are more likely to practice CSR.<sup>22</sup> We construct three variables using data from the Stateline database (<http://www.stateline.org>) and the CQ Electronic Library (<http://library.cqpress.com>). The first variable, *President vote, democrats* is the proportion of votes in the state received by the Democratic candidate

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<sup>21</sup>In addition, Gromet et al. (2012) 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 (2010).

<sup>22</sup>We use Compustat data for the location of firms' headquarters (or actual firm 10K reports when information is missing). It can be argued that firms may change their headquarter location in response to changes in a state's political attitude. In our sample, we did not find a significant number of companies that changed the location of their headquarters. Our results are also robust if we keep only companies headquartered in the state for more than 20 years.

for president. The second variable *Congress, democrat* is measured as 0.5 x proportion of Senators who are Democrats + 0.5 x proportion of Congressmen who are Democrats from a particular state. The third variable, *State government, democrats* is 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.

Table IX reports the results of the first-stage and second-stage Instrumental Variables estimation using these political variables. Specification 1 displays the first stage, and specifications 3 and 5 display the second stages for the  $\beta$  and *Tobin's Q* regressions, respectively. The list of variables includes the above instrumental variables and all control variables. In the first stage, we regress the firm CSR score on the instruments and all the control variables. As expected, firms headquartered in more Democratic-leaning states have higher CSR scores (the first and the third instruments are positive and significant). In the second stage, we use the fitted values of CSR as an independent regressor to explain firm systematic risk and *Tobin's Q*. In specification 3 when firm  $\beta$  is the dependent variable, the regression coefficient on the instrumented CSR variable remains negative and significant. The magnitude of the coefficient ( $-0.1474$ ) implies a reduction of  $\beta$  of 0.096 for an increase in instrumented CSR of one standard deviation equal to 0.648 (untabulated), which is more than double the effect in the OLS regression in Table V. In specification 5, the coefficient on instrumented firm CSR (0.3910) implies an increase in firm value of 0.2534 for an increase in instrumented CSR of one standard deviation equal to 0.648, which is almost double the effect in the OLS regressions in Table VIII.

**[Insert Table IX here]**

We run a series of specification tests reported in the last three rows of Table IX. First, we run the Hausman (1978) test of endogeneity. The null hypothesis in this test is that OLS and IV estimation produce similar coefficients. The alternative hypothesis is that IV

coefficients are different from OLS coefficients and IV is preferable to OLS. The test is conducted by regressing the CSR score on the instruments and other exogenous variables and then using the residuals from this regression in the second-stage regression. If the residuals are significant, endogeneity is a concern. We find that the test's  $F$ -statistic is 3.056 with a  $p$ -value of 0.08 for the risk regression and 3.662 with a  $p$ -value of 0.05 for the value regression, suggesting the presence of endogeneity. The second test we run is on the joint significance of the instruments. The first-stage regression of CSR on the political instruments and other exogenous variables produces an  $F$ -statistic of joint significance of 58.922 with a  $p$ -value of 0.0, indicating that the instruments are significant. The third test we run is Hansen's (1982) test of overidentifying restrictions that tests for the exogeneity of the instruments. To perform the test, we first collect IV regression residuals and then use them as dependent variables in regressions with the instruments and control variables. The independent variables are jointly insignificant ( $\chi^2$  statistic of 2.056 with  $p$ -value of 0.15 in the  $\beta$  regression and  $\chi^2$ -statistic of 2.148 with  $p$ -value of 0.12 in the *Tobin's Q* regression) rejecting the null that the political instruments are endogenous. Overall, while there is some evidence of endogeneity in the CSR-risk and CSR-valuation relations, our tests suggest that instrumented CSR is significantly related in a negative way with firm systematic risk and positively to firm value and that the political instruments are exogenous.

The second set of instruments is based on two variables. The first variable, *Industry disasters*, contains information on environmental and engineering disasters. The second variable, *Product recalls*, contains information on company product recalls. Disasters are largely unexpected and we adjust them for how important they are based on the number of deaths caused. Product recalls are also often unexpected. We weight them by the media coverage during the five days subsequent to the announcement of the recall. These adjustments guarantee that disasters and product recalls that are more important receive a larger weight. We obtain data on environmental and engineering disasters using information

from the Center for Research on the Epidemiology of Disasters and newspaper articles from the Lexis-Nexis database. Except for the oil and nuclear leakages, we include only those disasters that resulted in at least 1 death to increase the significance of the event. There are a total of 53 disasters in our sample years. The type of disasters we consider include oil spills (26), nuclear leakages (6), mine accidents (3), air carrier crashes (3), train (and other transportation) accidents (4), shipwrecks (2), structural failures (3), industrial explosions (2), fires (3), and building collapses (1). The total number of deaths is 423. We weight each disaster by the number of deaths. Because there were no deaths in the oil and nuclear accidents, we assign a conservative weight of one death to each of the accidents.<sup>23</sup> We assign each disaster to a two-digit SIC industry and use this industry variable as an instrument for firm CSR under the assumption that these events change consumers' perceptions regarding the whole industry. To give an example, Comair Flight 5191 (Delta Airlines) crash on August 27, 2006, resulted in 47 deaths. Therefore, 32 companies that belong to the two-digit SIC industry 45 (Transportation by air) in 2006 are assigned a weight of  $47/423 = 0.11$ .

We obtain data on product recalls from the U.S. Consumer Product Safety Commission. The advantage of this instrument over *Industry disasters* is that it is constructed at the firm-level, potentially increasing the power of our tests. We identify those recalls that were covered in at least one newspaper article. For the entire sample of 4,462 companies we identify 922 product recalls for 726 companies. To assign a greater weight to more important recalls, we weight each recall by the newspaper coverage over the five days after the event. Media coverage is based on hand-collected data on the number of newspaper articles from Lexis-Nexis. If more than one disaster occurs in an industry, or recall in a firm, in one year, we add the weights from each incident, respectively.

The results are reported in Table IX in specifications 2 and 4. From the first-stage regression (specification 2), firms in industries with more disasters and product recalls score

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<sup>23</sup>Our results are robust if do not apply any weighting scheme for the accidents.

lower on CSR (both instruments are negative and statistically significant). The second-stage regression for firm risk is presented in specification 4. The regression coefficient on the instrumented CSR variable remains negative and significant ( $-0.1676$  with  $t$ -statistic of  $-2.37$ ). This coefficient leads to a decrease in  $\beta$  of  $0.127$  for an increase in instrumented CSR of one standard deviation of  $0.760$  (untabulated), an effect that is over three times larger than the OLS estimate in Table V. The specification tests reported in Table IX indicate that the industry disaster and product recall instruments are relevant ( $F$ -statistic of  $10.021$  with a  $p$ -value of  $0.0$ ) and can be treated as exogenous ( $\chi^2$ -statistic of  $1.029$  with  $p$ -value of  $0.30$ ).

## 7 Conclusion

This paper studies a mechanism through which CSR policies affect a firm's systematic risk and valuation based on the premise that CSR is an investment in customer loyalty. Our theory and evidence point to consumers as important agents in influencing firm policies and their risk profiles. This is very different from other asset pricing as well as corporate finance theories that deal with the effects of corporate social responsibility. We view this difference as a strength, since our approach is in line with survey evidence that consumers, not investors, are more concerned about firms' CSR policies, in contrast to the corporate governance choices, where investor preferences appear to matter more. This paper thus fills a gap in the literature by formalizing a channel through which CSR policies affect firm systematic risk. The paper also contributes to the literature by offering an instrumental variables estimation that tries to deal with potential endogeneity concerns on the relations between CSR and firm systematic risk and CSR and valuation.

There are several potential avenues to enrich the model. For example, it might be interesting to model heterogenous consumers that differ in their level of wealth and where CSR goods are superior goods. 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 demand profiles across the business cycle. Also, not all CSR activities are geared towards customer loyalty. In a richer model, it may be interesting to study the link between CSR, employee loyalty and other firm variables.

Our results have important practical capital budgeting, portfolio selection and policy implications. Beta is the major parameter used in estimating the cost of equity. Given our results, we expect CSR companies to have lower cost of equity than non-CSR firms. 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 CSR stocks 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.

## Appendix

The Appendix contains proofs of the propositions in the paper and also an infinite horizon extension of the model.

### A Proofs

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

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

subject to the budget constraint,

$$W_2 = \int_0^1 p_i c_i di. \quad (\text{A.1})$$

Letting  $\lambda_2$  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

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

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

$$\begin{aligned} \alpha C_2^{1-\gamma} &= \lambda_2 \int_0^\mu p_i c_i di, \\ (1-\alpha) C_2^{1-\gamma} &= \lambda_2 \int_\mu^1 p_j c_j dj. \end{aligned}$$

Eliminating  $\lambda_2$  we see that  $\alpha$  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  $0 \leq i, l \leq \mu$  to get

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

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

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

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:

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

Replacing all in the budget constraint:

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

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:

$$\sigma_G p_j x_j = w A^{\eta_G} \kappa_G x_j$$

$$\sigma_P p_k x_k = w A^{\eta_P} \kappa_P x_k,$$

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

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

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

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

From the firms' problem

$$\frac{p_P}{p_G} = \frac{\sigma_G A^{\eta_P} \kappa_P}{\sigma_P A^{\eta_G} \kappa_G},$$

and we arrive at

$$\begin{aligned} p_P &= \bar{p} A^{-\alpha(\eta_G - \eta_P)}, \\ p_G &= \frac{\sigma_P \kappa_G}{\sigma_G \kappa_P} \bar{p} A^{(1-\alpha)(\eta_G - \eta_P)}, \end{aligned}$$

where

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

By construction this solution obeys  $P = 1$ .

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

$$\begin{aligned} c_G &= \frac{\alpha(1-\mu)p_P}{(1-\alpha)\mu p_G} c_P \\ &= \frac{\alpha(1-\mu)\sigma_G A^{\eta_P} \kappa_P}{(1-\alpha)\mu\sigma_P A^{\eta_G} \kappa_G} c_P. \end{aligned} \tag{A.4}$$

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

$$\mu A^{\eta_G} \kappa_G c_G + (1 - \mu) A^{\eta_P} \kappa_P c_P = L.$$

Using equation (A.4) again:

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

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

where

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

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

$$w = \bar{p} \frac{\sigma_P}{\kappa_P} A^{-\bar{\eta}},$$

where  $\bar{\eta} = (1 - \alpha) \eta_P + \alpha \eta_G$ . Profits are

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

for CSR firms and

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

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

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

■

**Proof of Proposition 2.** This proposition discusses conditions under which  $\mu < f_P$ , in terms of exogenous model parameters. Before we show the main result in the proposition, we show that the sign, but not the magnitude of  $\mu - f_P$  is independent of any heterogeneity in  $\kappa_j$  and  $\eta_j$ . To show this, note that the expenditure shares of CSR and non-CSR goods are  $\alpha$  and  $1 - \alpha$ , respectively, so that

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

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

$$\Delta \equiv (1 - \sigma_G) \frac{\alpha}{\mu} - (1 - \sigma_P) \frac{1 - \alpha}{1 - \mu}. \quad (\text{A.7})$$

Inserting this result into the equilibrium condition (15) proves that the sign of  $\mu - f_P$  is given only by the sign of  $\Delta$ , which is independent of any heterogeneity in  $\kappa_j$  and  $\eta_j$ . This is surprising because  $\eta_j$  describes the sensitivity of firm  $j$ 's labor demand to the aggregate shock (i.e., employee loyalty) and yet heterogeneity in  $\eta_j$  does not affect the relative proportion of CSR firms in the industry or their relative riskiness. The main reason is that with fixed expenditure shares and homogeneity of operating profits to sales revenue, the sensitivity of revenues to the productivity shock must in equilibrium be equal across types of consumption goods, i.e., it responds to  $\bar{\eta}$ . 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,

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

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

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

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

$$f_P > \frac{(1 - \sigma_G) \alpha}{1 - \sigma_P + (\sigma_P - \sigma_G) \alpha}.$$

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

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

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

**Proof of Proposition 3.** Write  $R_\pi$  using the equilibrium values of  $\pi_j$  and noting that

$\mu = f_G^*$ :

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

Before continuing, note that stock prices are

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

Define

$$\Delta \equiv (1 - \sigma_G) \frac{\alpha}{\mu} - (1 - \sigma_P) \frac{1 - \alpha}{1 - \mu}.$$

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

$$\bar{m} [\bar{p}\bar{x}]^{1-\gamma} E \left[ A^{-(1-\gamma)\bar{\eta}} \right] \Delta = f_G^* - f_P. \quad (\text{A.9})$$

Now take the derivative of  $R_\pi$  with respect to  $A^{-\bar{\eta}}$ :

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

The third line uses the definition of  $\Delta$  and combines the terms with  $(1 - \sigma_G) \frac{\alpha}{\mu}$ . The fourth line uses equation (A.9) to eliminate  $\mu - f_P$  and the last line uses the equilibrium value of  $Q_G^*$  in equation (A.8). It follows that  $\frac{dR_\pi}{dA^{-\bar{\eta}}} \geq 0$  if, and only if,  $\Delta \geq 0$ . From (A.9), and

noting that  $\mu = f_G^*$  in equilibrium, then  $\Delta \gtrless 0$  if and only if  $f_P - \mu \gtrless 0$ . From Proposition 2,  $f_P - \mu \gtrless 0$  if and only if  $\bar{\alpha} \gtrless \alpha$ . ■

**Proof of Proposition 4.** The investor's stochastic discount factor is,

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

Then, we have

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

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

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

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

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

The the marginal CSR firm:

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

Therefore,

$$E(r_P - r) \gtrless E(r_G^* - r) \text{ if, and only if, } f_P - \mu \gtrless 0.$$

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

**Proof of Proposition 5.** Recall that the gross return on firm  $i$  is defined as  $1 + r_i \equiv$

$(\pi_i - f_i(1 + r))/Q_i$  and that the value-weighted market return is  $1 + r_M \equiv \int (\pi_i - f_i(1 + r)) di / \int Q_j dj$ .

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  $f_i$  and  $r$  are constants

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

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

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

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

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

Thus,

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

or solving the integral,

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

For completeness, calculate total stock market value:

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

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

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

■

## B Infinite Horizon Model

Consider an infinite horizon version of the model where investors choose a consumption path to

$$\max E \left[ \sum_{t=0}^{\infty} \delta^t \frac{C_t^{1-\gamma}}{1-\gamma} \right],$$

subject to the period budget constraints,

$$C_t + \int D_{t+1i} Q_{ti} di \leq \int D_{it} (Q_{ti} + \pi_{ti} - \iota_i) di + \int \iota_i di + w_t L,$$

for all  $t$ . We use the same notation as before except for  $\iota_i$  which is the coupon paid on a console bond issued by firm  $i$  at time 0 to cover the initial fixed investment. We assume for simplicity that the growth rate of productivity shocks is an i.i.d. lognormal variable with  $E[\ln(A_{t+1}/A_t)] = g$  and  $Var[\ln(A_{t+1}/A_t)] = v$ .

With a representative investor, equilibrium stock holdings are  $D_{it} = 1$  for all  $i$  and  $t$ . From the budget constraint we get,

$$C_t = \int \pi_{ti} di + w_t L.$$

Because  $W_t = C_t$ , the static production problem faced by firms and the static problem of allocating consumption across all  $c_j$  goods is as before and the solution given in Proposition 1. Hence,

$$C_t = \bar{p}\bar{x} A_t^{-\bar{\eta}}.$$

The Euler equation pricing the stock of a generic firm  $j$  is,

$$\begin{aligned} Q_{tj} &= \delta E \left[ \left( \frac{C_{t+1}}{C_t} \right)^{-\gamma} (Q_{t+1j} + \pi_{t+1j} - \iota_j) \right] \\ &= \delta E \left[ \left( \frac{A_{t+1}}{A_t} \right)^{\gamma \bar{\eta}} \left( Q_{t+1j} + \bar{p}\bar{x} (1 - \sigma_j) \frac{\alpha_j}{\mu_j} A_{t+1}^{-\bar{\eta}} - \iota_j \right) \right]. \end{aligned}$$

Iterating forward and imposing a no bubbles solution obtains,

$$Q_{tj} = \bar{p}\bar{x} (1 - \sigma_j) \frac{\alpha_j}{\mu_j} A_t^{-\gamma \bar{\eta}} E_t \left[ \sum_{s=1}^{\infty} \delta^s A_{t+s}^{(\gamma-1)\bar{\eta}} \right] - \iota_j \psi_t,$$

where

$$\psi_t = E_t \left[ \sum_{s=1}^{\infty} \delta^s \left( \frac{A_{t+s}}{A_t} \right)^{\gamma \bar{\eta}} \right].$$

Using the lognormality assumption and letting  $\theta = g + \frac{1}{2} \gamma \bar{\eta} v$ :

$$\psi_t = \frac{\delta \exp^{\gamma \bar{\eta} \theta}}{1 - \delta \exp^{\gamma \bar{\eta} \theta}},$$

where we have assumed that  $\delta \exp^{\gamma \bar{\eta} \theta} < 1$  so bond prices are bounded. Without loss, we drop the time subscript from  $\psi$ . Furthermore,

$$Q_{tj} = \bar{p}\bar{x} (1 - \sigma_j) \frac{\alpha_j}{\mu_j} A_t^{-\bar{\eta}} \frac{\delta \exp^{(\gamma-1)\bar{\eta}(\theta - \frac{1}{2}\bar{\eta}v)}}{1 - \delta \exp^{(\gamma-1)\bar{\eta}(\theta - \frac{1}{2}\bar{\eta}v)}} - \iota_j \psi.$$

The assumption that  $\delta \exp^{\gamma \bar{\eta} \theta} < 1$  guarantees that equity prices (and life-time utility) are bounded.

The initial proceeds from issuing the console cover the fixed investment. With a console that is fairly priced we have:

$$f_j = \iota_j E_0 \left[ \sum_{s=1}^{\infty} \delta^s \left( \frac{A_s}{A_0} \right)^{\gamma \bar{\eta}} \right] = \iota_j \psi.$$

Thus,  $\iota_j = f_j / \psi$ .

Firm adoption decisions are assumed to take place at time 0. An interior solution for  $\mu$  is such that  $Q_G^* = Q_P$  at time 0. Having solved for the equilibrium fraction  $\mu$ , we can calculate the realized return to firm  $j$  at any time  $t + 1$ :

$$\begin{aligned} r_{t+1,j} &= \frac{Q_{t+1j} + \pi_{t+1j} - \iota_j}{Q_{tj}} - 1 \\ &= \frac{\frac{\bar{p}\bar{x}(1-\sigma_j)\alpha_j}{\mu_j} A_t^{-\bar{\eta}} \left[ \left( \frac{A_{t+1}}{A_t} \right)^{-\bar{\eta}} - \delta \exp^{(\gamma-1)\bar{\eta}(\theta - \frac{1}{2}\bar{\eta}v)} \right] - \iota_j}{Q_{tj}}. \end{aligned}$$

Taking expectations on both sides, firm  $j$ 's expected return is,

$$E_t [r_{t+1,j}] = \frac{\bar{p}\bar{x}\Theta (1 - \sigma_j) \frac{\alpha_j}{\mu_j} A_t^{-\bar{\eta}} - \iota_j}{Q_t},$$

where  $\Theta$  is a term that collects the impact of assumptions regarding the distribution of productivity shocks on expected returns and is a function of  $\bar{\eta}$ ,  $\delta$ ,  $\gamma$ ,  $g$  and  $v$ . The model of expected returns is similar to the static model in the main text and similar qualitative results arise from comparative statics on  $\sigma_l$  at the time of the decision to adopt CSR.

## C Variable Definitions

[Insert Table A.I here]

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**Table A.I. Variables, definitions, and sources.**

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

Variable	Definition	Source
<b>Corporate Social Responsibility</b>		
<i>Aggregate CSR</i>	It is the sum of the following CSR attributes: community, diversity, employee, environment, product, and human, all defined below. It is measured annually from 2003 through 2011.	MSCI's ESG ratings
<i>Community</i>	It is the difference between community strengths and weaknesses. Community lists 3 concerns (investment, economic impact, and tax disputes) and 7 strengths (charitable giving, innovative giving, support for housing, support for education, non-US charitable giving, volunteer programs, and community engagement). It is measured annually from 2003 through 2011.	
<i>Diversity</i>	It is the difference between diversity strengths and weaknesses. Diversity has 3 concerns (controversies, non-representation, and board diversity) and 8 strengths (CEO quality, promotion, board of directors, work-life benefits, women and minority contracting, employment of disabled, gay and lesbian policies, and underrepresented groups). It is measured annually from 2003 through 2011.	
<i>Employee</i>	It is the difference between employee relations strengths and weaknesses. Employee relations has 5 concerns (union relations, health concerns, workforce reductions, retirement benefits, and supply chain) and 7 strengths (union relations, no-layoff policy, profits sharing, employee involvement, retirement benefits, health and safety, and supply chain policies). It is measured annually from 2003 through 2011.	
<i>Environment</i>	It is the difference between environment strengths and weaknesses. Environment lists 9 concerns (waste, regulatory problems, ozone issues, emissions, agriculture chemicals, climate change, negative impact of product, biodiversity, and non-carbon releases) and 6 strengths (beneficial product, pollution prevention, recycling, clean energy, impact of property, and management system). It is measured annually from 2003 through 2011.	
<i>Product</i>	It is the difference between product strengths and weaknesses. Product has 3 concerns (product safety, marketing concerns, and antitrust) and 4 strengths (quality, innovation, benefits to economically disadvantaged, and access to capital). It is measured annually from 2003 through 2011.	
<i>Human</i>	It is the difference between human relations strengths and weaknesses. Human rights has 7 concerns (South Africa, Northern Ireland, Burma, Mexico, Sudan, labor rights, and indigenous people relations) and 3 strengths (South Africa, indigenous people relations, and labor rights strength). It is measured annually from 2003 through 2011.	
<i>Governance</i>	It is the difference between governance strengths and weaknesses. Governance lists 7 concerns (high compensation, ownership, accounting, transparency, political accountability, public policy, and governance structure) and 5 strengths (limited compensation, ownership structure, transparency, political accountability, and public policy). It is measured annually from 2003 through 2011.	
<i>Sin dummy</i>	This is a dummy variable that takes the value of one if a firm is involved in a controversial business issue, and zero otherwise. Controversial business issues are: firearms, gambling, military, nuclear, tobacco, and alcohol. Firearms concerns include producer of civilian arms, firearms retailer or distributor, ownership of a firearms company, ownership by a firearms company. Gambling concerns include operations, support, licensor, ownership of a gambling company, ownership by a gambling company. Military concerns include weapon systems, support systems, ownership of a military company, ownership by a military company. Nuclear concerns include builders and designers, suppliers, consulting, uranium mining, distributors, repairs. Tobacco concerns include licensor, producer, distributor, retailer, supplier, ownership of a tobacco company, ownership by a tobacco company. Alcohol concerns include producer, distributor, retailer, licensor, supplier, ownership of an alcohol company, ownership by an alcohol company. It is measured annually from 2003 through 2011.	
<b>Firm and Industry Variables</b>		
<i>Firm <math>\beta</math></i>	It is defined as the average value of estimation coefficients on market return and lagged market return in the regression of firm weekly excess return on market excess return, lagged market excess return, and the SMB and HML Fama-French factors. Each regression contains 52 observations. It is measured annually from 2004 through 2012.	CRSP
<i>Tobin's Q</i>	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 2012.	Compustat
<i>Ratio of CSR firm profits to non-CSR firm profits</i>	It is measured at the two-digit SIC industry level as mean net income [IB] of the firms in the top-third CSR score divided by the mean net income of the firms in the bottom-third CSR score. It is measured annually from 2004 through 2012.	
<i>R&amp;D</i>	It is defined as R&D expenditure [XRD] over total assets [AT]. It is measured annually from 2003 through 2011.	
<i>Advertising</i>	It is defined as advertising expenditures [XAD] over total assets [AT]. It is measured annually from 2003 through 2011.	
<i>Leverage</i>	It is defined as long-term debt [DLTT] over total assets [AT]. It is measured annually from 2003 through 2011.	
<i>CAPEX</i>	It is defined as capital expenditures [CAPX] over total assets [AT]. It is measured annually from 2003 through 2011.	
<i>Cash</i>	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 2011.	

<b>Sales growth</b>	It is defined as annual growth in sales [SALE]. It is measured annually from 2003 through 2011.	Compustat	
<b>ME</b>	It is the sum of the market value of equity $([PRCC \ F] \times [CSHO])$ over total assets [AT]. It is measured annually from 2003 through 2011.		
<b>Size</b>	It is defined as the log of total assets [AT]. It is measured annually from 2003 through 2011.		
<b>Dividend yield</b>	It is defined as the dividend [DVC] per share [CSHO] over fiscal year-end price [PRCC F]. It is measured annually from 2003 through 2011.		
<b>Age</b>	It is measured as the log of the number of years since IPO. It is measured annually from 2003 through 2011.		
<b>Earnings variability</b>	It is defined as the standard deviation of earnings [IB] per share [CSHO] using a five-year rolling window. It is measured annually from 2003 through 2011.		
<b>Diversification</b>	It is measured as the number of three-digit SIC industries a firm operates in. It is measured annually from 2003 through 2011.		
<b>Operating leverage</b>	We follow Kahl et al. (2012) in measuring operating leverage. Operating leverage is measured as the sensitivity of growth in total operating costs to growth in sales. To calculate the measure, 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. Then, we generate the innovations to the growth rates. Operating leverage is -1 multiplied by the regression coefficient of the time-series regression of innovations in growth rates of operating costs on innovations in growth rates of sales. It is measured annually from 2003 through 2011.		
<b>Hoberg&amp;Phillips product similarity</b>	For every firm, Hoberg and Phillips (2010) perform a textual analysis of parts of 10K where companies describe their products. For every possible pair of firms $i$ and $j$ in Compustat, they form a vector of words describing the products and derive their similarity index. This measure is then aggregated for every firm across all other possible competitors. Larger values of this index indicate greater product similarity. The original index is divided by 10,000. It is measured annually from 2003 through 2008.		Hoberg and Phillips data website, <a href="http://www.rhsmith.umd.edu/industrydata.htm">http://www.rhsmith.umd.edu/industrydata.htm</a> . See Hoberg and Phillips (2010) for more details.
<b>Differentiated good industry</b>	This dummy takes the value of 1 if the firm is in industries defined in Giannetti et al. (2011) as differentiated-product industries, and zero otherwise. The differentiated-product industries are: furniture and fixture; printing and publishing; rubber and plastic products; stone, glass, and clay products; fabricated metal products; machinery; electrical equipment; transportation equipment; instruments; miscellaneous products.		Giannetti et al. (2011)
<b>Industry top-CSR market capitalization</b>	Industry top-CSR market capitalization is defined at the two-digit SIC industry as market share $[PRC \times SHROUT]$ of top-third CSR firms relative to industry total market share. It is measured annually from 2003 through 2011.	CRSP	
<b>GDP growth rate</b>	It is measured as GDP growth expressed in 2003 dollars. It is measured annually from 2003 through 2011.	World Bank's World Development Indicators	
<b>Instrumental Variables</b>			
<b>President vote, democrats</b>	This variable is the proportion of votes in the state received by the Democratic candidate for president. It is measured annually from 2003 through 2011.	Stateline database ( <a href="http://www.stateline.org">http://www.stateline.org</a> ) and the CQ Electronic Library ( <a href="http://library.cqpress.com">http://library.cqpress.com</a> ).	
<b>Congress, democrat</b>	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 2011.		
<b>State government, democrat</b>	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 2011.		
<b>Disasters</b>	This variable takes the value of one for a two-digit SIC industry that experienced a disaster in a given year, and zero otherwise. We obtain data on environmental and engineering disasters. Except for the oil and nuclear leakages, we include only those disasters that resulted in at least 1 death. There is a total of 53 disasters in our sample years. The type of disasters we consider include oil spills (26), nuclear leakages (6), mine accidents (3), air carrier crashes (3), train (and other transportation) accidents (4), shipwrecks (2), structural failures (3), industrial explosions (2), fires (3), and building collapses (1). The total number of deaths is 423. To differentiate events by their impact, we weight each disaster by the number of deaths. Because there were no deaths in the oil and nuclear accidents, we conservatively assign the death toll in each of these events to equal one death. It is measured annually from 2002 through 2010.	Center for Research on the Epidemiology of Disasters and newspaper articles from the Lexis-Nexis Database.	
<b>Product recalls</b>	This variable takes the value of one for companies whose product was recalled in a given year, and zero otherwise. We consider those recalls that were covered in at least one newspaper article. For the entire sample of 4,462 companies we identify 922 product recalls for 726 companies. To assign a greater weight to more important recalls, we weight each recall by the number of newspaper articles coverage during the five days subsequent to each event. If more than one disaster occurs in an industry, or recall in a firm, in one year, we add the weights from each incident, respectively. It is measured annually from 2002 through 2010.	U.S. Consumer Product Safety Commission and newspaper articles from the Lexis-Nexis Database.	

**Table I. Summary Statistics for Corporate Social Responsibility**

This table presents summary statistics for social responsibility data obtained from MSCI ESG (environment, social, governance), formerly KLD Research & Analytics. The sample years are from 2003 through 2011. The aggregate corporate social responsibility (CSR) score is the sum of six attributes: community, diversity, employee relations, environment, product, and human rights. We exclude governance from the aggregate score calculation. Appendix C provides details on the attributes and aggregate CSR score. Panel A reports summary statistics for CSR attributes and aggregate CSR score. Panel B reports the means for aggregate CSR score and its attributes by year. Panel C reports summary statistics for aggregate CSR score by one-digit SIC codes.

**Panel A: Corporate Social Responsibility and its attributes**

Variable	Firm-years (2003-2011)	Mean	Std. dev.	Min	25%	Median	75%	Max
CSR	23,803	-0.362	2.162	-9	-2	-1	0	18
Community	23,803	0.051	0.486	-2	0	0	0	5
Diversity	23,803	-0.038	1.377	-3	-1	0	1	7
Employee	23,803	-0.193	0.792	-4	-1	0	0	5
Environment	23,803	0.009	0.715	-5	0	0	0	5
Product	23,803	-0.151	0.560	-4	0	0	0	2
Human	23,803	-0.039	0.228	-3	0	0	0	1
Governance	23,803	-0.261	0.747	-4	-1	0	1	2

**Panel B: Distribution by years**

Year	Firm-years	CSR	Community	Diversity	Employee	Environ- ment	Product	Human	Gover- nance
2003	2,565	-0.181	0.043	0.206	-0.163	-0.071	-0.138	-0.059	-0.005
2004	2,583	-0.362	0.053	0.170	-0.241	-0.110	-0.142	-0.092	-0.119
2005	2,599	-0.339	0.036	0.190	-0.271	-0.091	-0.164	-0.040	-0.160
2006	2,588	-0.362	0.039	0.181	-0.281	-0.086	-0.176	-0.039	-0.240
2007	2,560	-0.338	0.017	0.198	-0.241	-0.077	-0.192	-0.043	-0.257
2008	2,673	-0.332	0.006	0.176	-0.230	-0.056	-0.187	-0.041	-0.248
2009	2,712	-0.357	0.001	0.173	-0.246	-0.057	-0.189	-0.038	-0.233
2010	2,803	-0.616	0.120	-0.797	-0.068	0.278	-0.142	-0.006	-0.220
2011	2,720	-0.347	0.135	-0.752	-0.014	0.312	-0.033	0.006	-0.842
Total	23,803								

**Panel C: Distribution by industries**

SIC code	Industry	Firm- years	% of sample	CSR mean	CSR std. dev.	CSR min	CSR max
100-900	Agriculture and Fishing	63	0.26%	-1.651	2.178	-8	3
1000-1700	Mining and Construction	1,278	5.37%	-1.409	1.768	-9	5
2000-2900	Manufacturing I	3,418	14.36%	-0.235	2.636	-8	16
3000-3900	Manufacturing II	5,658	23.77%	-0.309	2.269	-8	18
4000-4900	Transportation and Utilities	2,223	9.34%	-0.695	2.085	-9	9
5000-5900	Wholesale Trade and Retail Trade	2,201	9.25%	-0.396	2.088	-7	12
6000-6700	Finance, Insurance, and Real Estate	5,294	22.24%	-0.162	1.822	-6	14
7000-7900	Services I	2,748	11.54%	-0.107	2.139	-5	14
8000-8900	Services II	883	3.71%	-0.639	1.533	-5	9
9000-9900	Public Administration	37	0.16%	-0.405	3.227	-6	6
<b>Total</b>		<b>23,803</b>	<b>100.00%</b>				

**Table II. Correlation Coefficients Between CSR Attributes**

This table presents correlation coefficients between aggregate CSR score, its attributes, and the sin dummy variable. The attributes are community, diversity, employee relations, environment, product, and human rights. We also include the attribute governance, which is not part of the aggregate CSR score. The sample years are from 2003 through 2011. The sin dummy variable takes the value of one if a firm has one of the sin concerns and 0 otherwise. The concern categories are: firearms, gambling, military, nuclear, tobacco, and alcohol. Appendix C provides details on the attributes, aggregate CSR score and sin dummy. The numbers in parentheses are probability levels at which the hypothesis of a zero correlation can be rejected. The superscripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	Sin	Community	Diversity	Employee	Environ- ment	Product	Human	Gover- nance
<b>Community</b>	-0.026 <sup>***</sup> (0.00)							
<b>Diversity</b>	0.064 <sup>***</sup> (0.00)	0.287 <sup>***</sup> (0.00)						
<b>Employee</b>	-0.028 <sup>***</sup> (0.00)	0.113 <sup>***</sup> (0.00)	0.082 <sup>***</sup> (0.00)					
<b>Environment</b>	-0.120 <sup>***</sup> (0.00)	0.274 <sup>***</sup> (0.00)	0.146 <sup>***</sup> (0.00)	0.100 <sup>***</sup> (0.00)				
<b>Product</b>	-0.120 <sup>***</sup> (0.00)	-0.068 <sup>***</sup> (0.00)	-0.211 <sup>***</sup> (0.00)	0.067 <sup>***</sup> (0.00)	0.082 <sup>***</sup> (0.00)			
<b>Human</b>	-0.087 <sup>***</sup> (0.00)	-0.004 (0.50)	-0.109 <sup>***</sup> (0.00)	0.056 <sup>***</sup> (0.00)	0.144 <sup>***</sup> (0.00)	0.155 <sup>***</sup> (0.00)		
<b>Governance</b>	-0.019 <sup>***</sup> (0.00)	-0.003 (0.63)	-0.0220 <sup>***</sup> (0.00)	-0.002 (0.79)	0.075 <sup>***</sup> (0.00)	0.153 <sup>***</sup> (0.00)	0.082 <sup>***</sup> (0.00)	
<b>CSR</b>	-0.055 <sup>***</sup> (0.00)	0.521 <sup>***</sup> (0.00)	0.713 <sup>***</sup> (0.00)	0.500 <sup>***</sup> (0.00)	0.558 <sup>***</sup> (0.00)	0.177 <sup>***</sup> (0.00)	0.143 <sup>***</sup> (0.00)	0.058 <sup>***</sup> (0.00)

**Table III. Summary Statistics of Main Variables**

This table presents summary statistics (mean, standard deviation, minimum, 25<sup>th</sup>, 50<sup>th</sup> (median) and 75<sup>th</sup> percentiles and maximum) for the main variables. The sample is the merged set between COMPUSTAT, CRSP, and MSCI ESG (environment, social, governance) formerly KLD Research & Analytics. Appendix C provides details on the definition of the variables. The sample years are from 2004 through 2012 for Firm  $\beta$  and Tobin's Q, and from 2003 through 2011 for all other variables (independent variables are lagged with respect to the dependent variables). All variables, except for aggregate CSR score, are winsorized at the 1% and 99% levels.

Variable	Firm-years	Mean	Std. dev.	Min	25%	Median	75%	Max
Firm $\beta$	23,803	0.914	0.409	0.168	0.572	0.917	1.212	2.205
Tobin's Q	23,803	1.927	1.419	0.524	1.114	1.442	2.215	10.020
CSR	23,803	-0.362	2.162	-9	-2	-1	0	18
R&D	23,803	0.035	0.076	0.000	0.000	0.000	0.031	0.455
Advertising	23,803	0.009	0.027	0.000	0.000	0.000	0.004	0.175
Leverage	23,803	0.189	0.202	0.000	0.010	0.132	0.301	0.899
CAPEX	23,803	0.041	0.054	0.000	0.008	0.024	0.053	0.307
Cash	23,803	0.482	1.625	0.000	0.031	0.100	0.335	5.474
Sales growth	23,803	0.158	0.483	-0.734	-0.006	0.086	0.209	5.462
ME	23,803	1.293	1.310	0.037	0.430	0.895	1.655	7.111
Size	23,803	7.232	1.703	3.676	5.996	7.117	8.286	11.964
Dividend yield, %	23,803	1.416	2.500	0.000	0.000	0.000	1.994	15.270
Age	23,803	2.303	0.884	0.000	1.609	2.302	2.639	3.912
Earnings variability	23,803	2.302	0.347	0.332	0.447	2.412	7.816	37.559
Diversification	23,803	4.260	0.450	1.000	2.000	4.000	5.000	16.000
Operating leverage	23,803	-0.986	3.694	-6.440	-0.690	-0.990	-0.280	4.290
Hoberg&Phillips product similarity	15,001	0.0773	0.143	0.010	0.128	0.216	0.501	10.001

**Table IV. Panel Regressions of Firm  $\beta$  on CSR and Its Attributes with Firm Fixed Effects and Year Fixed Effects**

This table reports the results of panel regressions of *Firm  $\beta$*  on aggregate CSR score (governance excluded) and its attributes (community, diversity, employee relations, environment, product, and human rights). Specification 9 includes governance in the CSR score calculation. Specification 11 controls for the sin dummy. The regressions are run using the panel of firm-year observations from 2003 through 2012. All independent variables are lagged by one year. Every regression includes firm and year fixed effects. Standard errors are clustered by firms and years to adjust for arbitrary heteroskedasticity, cross-sectional, and time-series correlation. The numbers in parentheses are *t*-statistics. The superscripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. All variables except for CSR are winsorized at the 1% and 99% levels. Appendix C contains a detailed description of all the variables.

Specification	1	2	3	4	5	6	7	8	9	10	11
<b>Dependent variable</b>	<i>Firm <math>\beta</math></i>										
lagged CSR	-0.0168 <sup>***</sup> (-6.14)										-0.0152 <sup>***</sup> (-5.71)
lagged Community		-0.0321 <sup>***</sup> (-3.15)									
lagged Diversity			-0.0199 <sup>***</sup> (-3.41)								
lagged Employee				-0.0155 <sup>**</sup> (-2.32)							
lagged Environment					-0.0312 <sup>***</sup> (-6.92)						
lagged Product						0.0020 (0.24)					
lagged Human							-0.0842 <sup>***</sup> (-4.42)				
lagged Governance								0.0036 (0.63)			
lagged CSR (with Gov.)									-0.0115 <sup>***</sup> (-5.09)		
lagged Sin dummy										0.0350 (1.48)	0.0212 (0.93)
Number of firm-years	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803
R <sup>2</sup>	0.537	0.537	0.537	0.537	0.537	0.536	0.537	0.536	0.538	0.536	0.537

## Table V. Panel Regressions of Firm $\beta$ on CSR and Its Attributes with Control Variables, Firm Fixed Effects and Year Fixed Effects

This table reports the results of panel regressions of *Firm  $\beta$*  on aggregate CSR score (governance excluded), its attributes (community, diversity, employee relations, environment, product, and human rights) and other controls. Specification 10 includes governance in the CSR score calculation. Specification 11 controls for the sin dummy. The regressions are run using the panel of firm-year observations from 2003 through 2012. All independent variables are lagged by one year. Every regression includes firm and year fixed effects. Standard errors are clustered by firms and years to adjust for arbitrary heteroskedasticity, cross-sectional, and time-series correlation. The numbers in parentheses are *t*-statistics. The superscripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. All variables except for CSR are winsorized at the 1% and 99% levels. Appendix C contains a detailed description of all the variables.

Specification	1	2	3	4	5	6	7	8	9	10	11
Dependent variable	<i>Firm <math>\theta</math></i>										
CSR variable included in the regression		CSR	Community	Diversity	Employee	Environment	Product	Human	Governance	CSR (with Gov.)	CSR
lagged CSR variable		-0.0158*** (-6.47)	-0.0312*** (-3.35)	-0.0271*** (-3.94)	-0.0129** (-2.38)	-0.0317*** (-5.84)	0.0027 (0.20)	-0.0769*** (-4.33)	0.0032 (0.59)	-0.0114*** (-5.47)	-0.0150*** (-6.32)
lagged Sin dummy											0.0282 (1.20)
lagged Operating leverage	0.0063 (0.92)	0.0045 (0.69)	0.0050 (0.77)	0.0055 (0.84)	0.0049 (0.75)	0.0045 (0.69)	0.0051 (0.78)	0.049 (0.75)	0.0054 (0.82)	0.0049 (0.74)	0.0045 (0.77)
lagged R&D	-0.4990*** (-3.62)	-0.4554*** (-3.58)	-0.4621*** (-3.50)	-0.4628*** (-3.47)	-0.4672*** (-3.42)	-0.4737*** (-3.45)	-0.4620*** (-3.52)	-0.4685*** (-3.57)	-0.4667*** (-3.60)	-0.4730*** (-3.54)	-0.4742*** (-3.46)
lagged Advertising	-0.0402 (-0.30)	-0.0120 (-0.12)	-0.0234 (-0.14)	-0.0308 (-0.16)	-0.0326 (-0.12)	-0.0217 (-0.19)	-0.0282 (-0.14)	-0.0284 (-0.13)	-0.0219 (-0.18)	-0.0192 (-0.15)	-0.0176 (-0.10)
lagged Leverage	0.2717*** (4.39)	0.2386*** (4.35)	0.2312*** (4.37)	0.2440*** (4.21)	0.2380*** (4.24)	0.2428*** (4.25)	0.2375*** (4.32)	0.2329*** (4.36)	0.2314*** (4.17)	0.2289*** (4.29)	0.2620*** (4.20)
lagged CAPEX	-0.0714 (-0.48)	-0.0913 (-0.58)	-0.0920 (-0.60)	-0.0968 (-0.62)	-0.1000 (-0.58)	-0.1014 (-0.77)	-0.1021 (-0.73)	-0.1117 (-0.70)	-0.1102 (-0.62)	-0.1152 (-0.62)	-0.1019 (-0.67)
lagged Cash	0.2214*** (3.85)	0.1915*** (3.20)	0.1988*** (3.27)	0.2014*** (3.20)	0.2157*** (4.14)	0.2072*** (3.97)	0.1929*** (3.94)	0.1921*** (3.59)	0.1968*** (3.62)	0.2081*** (3.65)	0.2005*** (3.90)
lagged Sales growth	0.0071 (1.26)	0.0082 (1.31)	0.0070 (1.30)	0.0089 (1.42)	0.0162 (1.20)	0.0150 (1.26)	0.0155 (1.24)	0.0094 (1.21)	0.0092 (1.15)	0.0088 (1.20)	0.0099 (1.14)
lagged ME	0.0513*** (7.62)	0.0451*** (7.44)	0.0482*** (7.41)	0.0416*** (7.40)	0.0421*** (7.34)	0.0390*** (7.30)	0.0422*** (7.27)	0.0488*** (7.21)	0.0484*** (7.16)	0.0479*** (8.02)	0.0522*** (7.20)
lagged Size	0.0087 (0.65)	0.0096 (0.47)	0.0065 (0.49)	0.0069 (0.42)	0.0108 (0.48)	0.0136 (0.651)	0.0182 (0.57)	0.0146 (0.52)	0.0146 (0.55)	0.0139 (0.64)	0.0171 (0.57)
lagged Dividend yield	0.2940** (2.37)	0.244** (2.48)	0.2939** (2.43)	0.2937** (2.40)	0.2942** (2.28)	0.2944** (2.39)	0.2817** (2.47)	0.2851** (2.41)	0.2903** (2.32)	0.3014** (2.43)	0.2848** (2.30)
lagged Age	0.0084 (0.68)	0.0130 (0.69)	0.0054 (0.65)	0.0007 (0.53)	0.0050 (0.59)	0.0040 (0.52)	0.0069 (0.42)	0.0078 (0.44)	0.0074 (0.64)	0.0139 (0.67)	0.0214 (0.53)
lagged Earnings variability	0.0121 (0.21)	0.0202 (0.17)	0.0186 (0.19)	0.0107 (0.19)	0.0185 (0.18)	0.0141 (0.17)	0.0216 (0.18)	0.0249 (0.20)	0.0163 (0.20)	0.0249 (0.21)	0.0283 (0.22)
lagged Diversification	0.0076*** (3.12)	0.0072*** (3.16)	0.0064*** (3.12)	0.0049*** (3.07)	0.0052*** (3.12)	0.0054*** (3.17)	0.0058*** (3.05)	0.0079*** (3.17)	0.0070*** (3.21)	0.0014*** (3.07)	0.0122*** (3.19)
Number of firm-years	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803	23,803
R <sup>2</sup>	0.544	0.545	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.545

**Table VI. Regressions of Firm  $\beta$  on CSR by Year**

This table reports the coefficient on aggregate CSR score in the regressions of *Firm  $\beta$*  on aggregate CSR score as in specification 1 of Table IV (in Panel A) and aggregate CSR score and controls as in specification 2 of Table V (shown in Panel B). Standard errors are adjusted for heteroskedasticity. The numbers in parentheses are *t*-statistics. The superscripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Year	Panel A: Specification without controls			Panel B: Specification with controls		
	CSR	t-stat	N.Obs.	CSR	t-stat	N.Obs.
2011	-0.0208 ***	(-5.90)	2,720	-0.0195 ***	(-4.14)	2,720
2010	-0.0239 ***	(-5.22)	2,803	-0.0198 ***	(-4.62)	2,803
2009	-0.0065	(-1.18)	2,712	0.0023	(0.38)	2,712
2008	-0.0212 ***	(-4.59)	2,673	-0.0139 ***	(-3.17)	2,673
2007	-0.0172 ***	(-3.70)	2,560	-0.0166 ***	(-3.42)	2,560
2006	-0.0450 ***	(-8.14)	2,588	-0.0314 ***	(-6.58)	2,588
2005	-0.0391 ***	(-6.97)	2,599	-0.0322 ***	(-6.13)	2,599
2004	-0.0362 ***	(-5.89)	2,583	-0.0318 ***	(-5.21)	2,583
2003	-0.0042	(-0.69)	2,565	-0.0191 **	(-2.25)	2,565

**Table VII. Panel Regressions of Firm  $\beta$  on CSR Conditional on Differentiated Goods Industry, Product Similarity, and Industry top-CSR Market Capitalization**

In specifications 1-3 we report the results of panel regressions of *Firm  $\beta$*  on aggregate CSR score (governance excluded) and interactions of CSR with *Differentiated goods industry* dummy variable (specification 1), *Hoberg and Phillips product similarity*, (specification 2), and *Industry Top-CSR market capitalization* (specification 3). Specification 4 reports regression of *Profit ratio* on GDP per capita growth and two-digit SIC industry dummies. The sample years are from 2003 through 2012 (independent variables in specifications 1-4 are lagged with respect to the dependent variables). Regressions in specifications 1-3 include all control variables as in Table V. Differentiated goods industries (24% of the sample) are taken from Giannetti, et al. (2011): furniture and fixture; printing and publishing; rubber and plastic products; stone, glass, and clay products; fabricated metal products; machinery; electrical equipment; transportation equipment; instruments; miscellaneous products. Industry top-CSR market capitalization is defined at the two-digit SIC industry as market share of top-third CSR firms relative to industry total market share. Profit ratio is defined at the two-digit SIC industry as the mean net income of the firms in the top-third CSR score divided by the mean net income of the firms in the bottom-third CSR score. Appendix C provides details on the definition of the variables. Except in specification (4), standard errors are clustered by firms and years to adjust for arbitrary heteroskedasticity, cross-sectional, and time-series correlation. The numbers in parentheses are *t*-statistics. Superscripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. All firm variables, except for CSR, are winsorized at the 1% and 99% levels.

Specification	1	2	3	4
Dependent variable	<i>Firm <math>\beta</math></i>			<i>Profit ratio</i>
lagged CSR	-0.0181 ** (-6.78)	-0.0243 *** (-5.19)	-0.0198 *** (-4.60)	
GDP growth				-0.122 *** (-6.15)
Differentiated goods industry dummy	0.1950 *** (22.74)			
Differentiated goods $\times$ lagged CSR	-0.0061 *** (-3.08)			
Hoberg&Phillips similar goods		-0.2132 * (-1.63)		
Hoberg&Phillips similar goods $\times$ lagged CSR		0.0981 *** (5.14)		
Industry top-CSR market cap			-0.0098 ** (-1.75)	
Industry top-CSR market cap $\times$ lagged CSR			0.0079 *** (3.20)	
All control variables included	yes	yes	yes	no
Firm fixed effects	no	yes	yes	no
Industry fixed effects	no	no	no	yes
Year fixed effects	yes	yes	yes	no
Number of obs.	23,803	15,001	23,803	442
R <sup>2</sup>	0.185	0.594	0.546	0.277

**Table VIII. Panel Regressions of *Tobin's Q***

This table reports the results of panel regressions of *Tobin's Q* on aggregate CSR score (specification 1) and interactions of firm CSR with Differentiated goods industry dummy variable (specification 2), Hoberg-Phillips product similarity (specification 3), and Industry top-CSR market capitalization (specification 4). The regressions are run using the panel of firm-year observations from 2003 through 2012. Independent variables are lagged by one year. Appendix C provides details on the definition of the variables. Specifications 1, 3, and 4 include firm and year fixed effects. Standard errors are clustered by firms and years to adjust for arbitrary heteroskedasticity, cross-sectional, and time-series correlation. The numbers in parentheses are *t*-statistics. The upper scripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. All variables except for CSR are winsorized at the 1% and 99% levels.

Specification	1	2	3	4
<b>Dependent variable</b>	<b><i>Tobin's Q</i></b>			
lagged CSR	0.0630 <sup>***</sup> (9.17)	0.0487 <sup>***</sup> (8.68)	0.0481 <sup>***</sup> (5.66)	0.0523 <sup>***</sup> (6.39)
Differentiated goods industry dummy		-0.0794 <sup>**</sup> (-2.03)		
Differentiated goods × lagged CSR		0.0253 <sup>***</sup> (3.25)		
Hoberg&Phillips similar goods			0.2192 <sup>***</sup> (6.12)	
Hoberg&Phillips similar goods×lagged CSR			-0.0801 <sup>**</sup> (2.22)	
Industry top-CSR market cap.				0.0239 (0.54)
Industry top-CSR mark cap. ×lagged CSR				-0.0092 <sup>*</sup> (-1.70)
lagged Operating leverage	0.0042 (1.16)	0.0062 (1.60)	0.0068 (1.57)	0.0060 (1.58)
lagged R&D	1.9040 <sup>***</sup> (4.07)	4.1330 <sup>***</sup> (11.75)	4.0203 <sup>***</sup> (11.69)	4.1774 <sup>***</sup> (11.20)
lagged Advertising	1.3536 (1.32)	2.9044 <sup>***</sup> (3.20)	2.7839 <sup>***</sup> (3.29)	2.8023 <sup>***</sup> (3.10)
lagged Leverage	-0.2041 <sup>**</sup> (-1.69)	-0.1288 (-0.90)	-0.1142 (-0.88)	-0.1158 (-0.68)
lagged CAPEX	1.3037 <sup>***</sup> (4.63)	1.8227 <sup>***</sup> (8.02)	1.9839 <sup>***</sup> (8.27)	1.7482 <sup>***</sup> (7.22)
lagged Sales growth	0.2178 <sup>***</sup> (8.08)	0.3049 <sup>***</sup> (9.30)	0.3016 <sup>***</sup> (9.03)	0.3329 <sup>***</sup> (10.11)
lagged Size	-0.5663 (-13.13)	-0.1888 (-14.54)	-0.1839 <sup>***</sup> (-14.37)	-0.1663 <sup>***</sup> (-13.90)
lagged Age	-0.1219 <sup>***</sup> (4.34)	-0.2709 <sup>***</sup> (6.21)	-0.2840 <sup>***</sup> (6.21)	-0.2472 <sup>***</sup> (6.42)
lagged Diversification	-0.0324 (-1.21)	-0.0164 (-1.00)	-0.03240 (-1.10)	-0.0281 (-1.29)
Firm fixed effects	yes	no	yes	yes
Year fixed effects	yes	yes	no	yes
Number of firm-years	23,803	23,803	15,001	23,803
R <sup>2</sup>	0.581	0.272	0.584	0.583

**Table IX. Instrumental Variables Estimation**

This table reports the results of Instrumental Variables (IV) estimation for *Firm  $\beta$*  (specifications 3 and 4) and *Tobin's Q* (specification 5). The endogenous (instrumented) variable is aggregate firm CSR score. We consider two sets of instruments. The first set of instruments is based on state political environment where a company is headquartered (president vote, democrats; congress, democrats; state government, democrats). President vote, democrats is the proportion of votes received by the democratic candidate for president election. Congress, democrat is  $0.5 \times$  proportion of senators who are democrats +  $0.5 \times$  proportion of representatives who are democrats. State government, democrats is  $0.5 \times$  dummy if a governor is democrat +  $0.25 \times$  dummy if upper Chamber is controlled by democrats +  $0.25 \times$  dummy if lower Chamber is controlled by democrats. The second set of instruments is based on natural disasters and product recalls. A full description of these instruments is in the Appendix. Specifications 1 and 2 report the results of the first-stage regressions. Every regression contains all of the control variables as in Table V including firm fixed effects and year fixed effects. Standard errors are clustered by firm and year. The numbers in parentheses below the coefficient estimates are *t*-statistics for first-stage regressions and *z*-values for second-stage regressions. The superscripts \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. We also report the following diagnostic tests: Hausman (1978) endogeneity test; weak instruments test; and, Hansen (1982) exogeneity of instruments test. Low *p*-values for the *F*-statistics of the endogeneity test indicate that IV regression estimates are significantly different from OLS estimates and that IV estimation is warranted. Low *p*-values for the *F*-statistics of the weak instruments test indicate that the instruments are non-weak (or relevant). High *p*-values for the  $\chi^2$  stat of the Hansen exogeneity of instruments (overidentifying restrictions) test indicate that the instruments can be treated as exogenous.  $R^2$  for the second-stage regression is not reported because it has no meaning in IV estimation.

Specification	1	2	3	4	5
Dependent variable	CSR	CSR	Firm $\beta$	Firm $\beta$	Tobin's Q
	First-stage Regression	First-stage Regression	Second-stage Regression	Second-stage Regression	Second-stage Regression
Instrument Set			Political instruments	Dis./recalls instruments	Political instruments
President vote, democrats	1.092 <sup>***</sup> (3.17)				
Congress, democrats	0.3300 (1.20)				
State government, democrats	0.1217 <sup>***</sup> (4.38)				
lagged Disasters		-6.2207 <sup>**</sup> (2.09)			
lagged Product recalls		-4.2903 <sup>*</sup> (1.68)			
lagged Instrumented CSR			-0.1474 <sup>**</sup> (-2.07)	-0.1676 <sup>**</sup> (-2.37)	0.3910 <sup>**</sup> (10.28)
Number of firm-years	23,803	23,803	23,803	23,803	23,803
$R^2$	0.450	0.332			
Hausman endogeneity test, F-stat.			3.056 <sup>***</sup> (0.08)	4.396 <sup>*</sup> (0.06)	3.662 <sup>**</sup> (0.05)
Weak instruments test, F-stat.	58.922 <sup>***</sup> (0.00)	10.021 <sup>***</sup> (0.00)			
Hansen exogeneity test, $\chi^2$ stat.			2.056 (0.15)	1.029 (0.30)	2.148 (0.12)