Why Do Firms Do Good? Evidence From Managerial Efficiency ⋆

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Abstract

Are firms doing good? And, if so, why do they engage in social responsibility? To find out, we model corporate social responsibility (CSR) as a choice of the firm to self-restrain from the full exploitation of a production set that contains negative externalities. Compared to such an unconstrained set, some firms choose to behave 'responsible'. Therefore, they may deviate systematically from optimal costs and profits and produce inefficiently. We test this theory using stochastic frontier analysis to estimate firm-specific 'inefficiency', which is conditioned on CSR. CSR determines systematic deviations from optimal cost and profit functions of the firm rather than profitability or cost itself. This way of modeling allows us to identify why firms conduct CSR: altruism, strategic reasons, or 'greenwashing'. Using CSR data from Kidder, Lydenberg and Domini for 1991-2004, we establish that various constituting elements of CSR have a significant impact on profit and cost efficiency. Therefore, CSR can not be regarded as greenwashing. Instead, we provide evidence that supports the idea that strategic reasons is the predominant motive of CSR.

Key words: social responsibility, costs, profits, efficiency, stochastic frontier analysis, management
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1 Introduction

Increased public awareness and the attention of the media for social and environmental problems have put social, environmental, and ethical problems on the agenda (Heal, 2008). The increase in corporate social responsibility (CSR) activities may reflect different motives of the firm: altruism, strategic choices to maximize profits, and attempts to enhance the image of the firm without significantly changing business conduct – often also referred to as 'greenwash' (Frankental, 2001). In this paper, we investigate 1. whether firms that are perceived as engaging in CSR are actually significantly changing their business conduct or are simply 'greenwashing', and 2. whether firms that do engage in CSR are driven by strategic or by altruistic motives.

To this end we develop a model where CSR determines a firm's systematic deviation from an unconstrained production set. The latter also includes negative externalities. As such, we model CSR to represent voluntary self-restrain, which entails that some firms choose to incur systematically higher cost and systematically lower profits compared to the unconstrained, socially irresponsible industry benchmark. We test this model empirically with stochastic frontier analysis. This allows the estimation of firm-specific deviations from cost and profit optima, so-called inefficiency. In contrast to previous literature relating firm performance and CSR, we are to our knowledge the first to model CSR as cost and profit efficiency determinants rather than direct cost and profit determinants. This is important since profitability and profit efficiency measure different dimensions of performance. For instance, even a relatively profitable firm may still not have realized it's full potential compared to peers given observed production plan choices and profits. Therefore, we model CSR to determine such systematic deviations, thereby aiming to contribute to the literature on the relation between financial performance and CSR from a novel angle.

CSR relates to the ways in which firms account for the social and environmental impact of their business as well as to their ethical conduct (see McWilliams et al., 2006). CSR constitutes a basket of attributes regarding firm behavior. For example, it relates to the treatment of employees and customers, to interaction with the community, the impact on the environment, ethical conduct, and governance of the firm (Hillman and Keim, 2001). There are many defini-

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tions of CSR, but for most scholars CSR occurs when firms engage in activities that appear to advance a social, environmental or ethical agenda beyond that which is required by law (Siegel and Vitaliano, 2006; Lyon and Maxwell, 2007; Heal, 2008). Furthermore, Baron (2001) makes a clear distinction between 'altruistic' CSR and 'strategic' CSR. Altruistic CSR relates to activities that do not directly positively affect financial performance of the firm, but that are undertaken for their own sake. Strategic CSR, on the other hand, aims at improving financial performance by engaging in CSR.

Recent theories of CSR (see McWilliams and Siegel, 2000, 2001; Baron, 2001; Hillman and Keim, 2001; Bagnoli and Watts, 2003) assert that firms especially engage in 'strategic' or 'profit-maximizing' CSR. Basically, the argument is that both costs and revenues are affected by engaging in CSR. Costs will increase because the changes of production processes require money and it simply costs money to mitigate the impact of external effects of production. If firms were to merely 'internalise non-market costs' (Heal, 2005), without expecting anything in return, this would constitute altruistic CSR. However, CSR may positively impact on earnings too, for example because of a mark-up owed to their responsible conduct or since they are operating in a market segment with much less competition. In this respect, CSR is a way of product differentiation. Basic economic theory simply dictates that for CSR to be 'rational', the benefits of CSR are balanced with the costs of CSR, resulting in 'strategic' CSR.

At the same time, many non-governmental organizations (NGOs) are rather skeptic about this response from the business community and often refer to CSR as 'greenwash' (Blowfield and Murray, 2008). They accuse firms of just telling good news about their products and production processes but not really internalizing their external economic effects. That is, the actual investment in social or environmental activities is insignificant, but companies use this part of their business conduct to improve their image or market their products. Meanwhile, firms keep on polluting and wasting natural resources. This critical view identifies CSR as mere windowdressing and, as such, disregards the possibility of strategic or altruistic CSR.

The key objective of our paper is to solve two issues. First whether or not firms are greenwashing their operations. Second whether CSR behavior can be labeled as altruistic (profit reducing) or as strategic (profit enhancing). To

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this extent, we apply stochastic frontier analysis to investigate both cost efficiency and profit efficiency. In our opinion, engaging in CSR implies that firms restrain their own conduct, i.e. they limit their set of production possibilities in the short run. This suggests that the alleged benefits of CSR may come at a cost. Therefore, by estimating cost functions, we can first identify whether firms that are labeled as socially responsible are actually 'doing something different'. We expect to find that socially responsible firms are more cost-inefficient than irresponsible firms. If there are no clear differences in costs between responsible and irresponsible firms, this would suggest that firms are merely greenwashing. Strategic CSR implies that, in equilibrium, the benefits of behaving socially responsible should at least outweigh the costs. Therefore, we next estimate profit functions to see whether the firms that engage in CSR are profit-efficient. If the estimates in the first stage imply higher costs for these firms and it turns out that they are also not profit-efficient, we can conclude that these firms engage in altruistic CSR. If, however, responsible firms are profit-efficient, we consider their actions as demonstrating strategic CSR.

Our paper relates to the literature that connects CSR to firm performance (for example, Margolis and Walsh, 2003) and to the literature that tries to identify potential production inefficiencies (for example, Kumbhakar and Lovell, 2000). The contribution of our paper is that we succeed in establishing how different constituting elements of CSR are related to a firm's efficiency. In line with the strategic view of CSR, the empirical economic analysis of CSR has established some stylized facts, namely that CSR appears to be positively associated with corporate financial performance (Margolis and Walsh, 2001, 2003; Orlitzky et al., 2003). Margolis and Walsh (2001) report about 95 studies of the relationship between CSR and financial performance in the period 1972-2000 (in an extended analysis Margolis and Walsh (2003) cover 127 studies). They report very mixed results. Most studies find a positive and significant association. But Margolis and Walsh (2001) also find that many studies are subject to severe methodological flaws. Furthermore, the exact transmission mechanism between financial and social performance remains opaque. As far as we are aware of, a systematic analysis of how CSR impacts on cost and profit efficiency of the firm has not been undertaken. Vitaliano and Stella (2006) estimate a data envelopment analysis cost minimalization to analyze the relationship between CSR ratings and productivity with US community banks. They do not find differences in technical efficiency, but there is a difference in

cost efficiency. Chapple et al. (2005) and Shadbegian and Gray (2006) assess CSR in connection with productivity for some other sectors (manufacturing industry and pulp and paper, oil and steel industries respectively). Bloom et al. (2008) assess energy intensity in British manufacturing firms and find that better managed firms are significantly less energy intensive. However, we did not come across any industry-wide assessment between CSR and cost and profit efficiency. Therefore, this study is the first to analyze cost and profit efficiency for a prolonged period of time on an industry-wide basis.

The remainder of this paper is structured as follows. In section 2, we introduce our theoretical model and its empirical implementation. Section 3 discusses our dataset. The results and discussion are in section 4. Section 5 concludes.

2 Methodology

We consider both cost and profit functions to relate indicators of social responsibility scores of firms to costs and profits. Rather than specifying social responsibility indicators directly as arguments of either optimal cost or profit functions, we hypothesize that they co-determine systematic deviations from cost minimizing and profit maximizing behavior of firms, respectively. To motivate this modeling approach, consider a firm that only produces one output. Its technology is characterized by a set of activities $A = \{a_k\} \subset R_+^{n+1}$, with each element $a_k = (y, x)$ a single production plan characterizing the possible output y given a vector of n production factors x, for some $x \in X \subset R_+^n$ and $y \in Y \subset R_+$. It is convenient to assume that technologies are monotonic and convex. We formalize the concept of CSR by assuming that socially responsible firms restrict the number of activities they use in production or the use of some production factor. Put differently, the set of socially responsible activities A_{SR} is a subset of all possible activities, $A_{SR} \subset A$. For example, by excluding polluting activities or the use of child labor, the firm is restricting the production possibility set. We assume that there are various subsets of A, associated with increasing responsibility, $A_1 \subset A_2 \subset .. \subset A_N \subset A$. Here A_1 is the subset of activities with 'highest responsibility', which is not necessarily the empty set. Let $SR = 1, ..., N$ be the index of social responsibility, that is, SR is associated with the production possibility set A_{SR}. To measure the implied inefficiency associated with CSR, it is important to study

the cost minimization and profit maximization problems of these production technologies.

2.1 Cost efficiency

A firm is cost-efficient if it minimizes its costs at given factor prices w for a given level of output y, or:

$$C(w, y) = \min_x wx, \text{subject to } F(x) = y, \tag{1}$$

with $F(x) = \max_a y, \{a = (a^k, a^l) \in A : x = a^l\}$. A socially responsible firm with a level of social responsibility equal to SR, however, faces an additional constraint:

$$C(w, y; SR) = \min_x wx, \text{subject to } F(x) = y \text{ and } (y, x) \in A_{SR}. \tag{2}$$

As a consequence, we expect that socially responsible firms will be less cost-efficient than less-responsible firms.

One possibility to find out whether this actually is the case is to estimate their cost function. In this respect, the SR indicator will be treated as a production factor, since we now can define production and cost functions for these various subsets in terms of inputs and the level of social responsibility, $F(x; SR)$ and $C(w, y; SR)$ respectively (with the properties that $F_{SR} < 0$ and $C_{SR} > 0$). However, empirically this is impossible to apply, since we do not observe 'factor prices' for CSR. In addition, we do not think CSR is a 'production factor', but a conscious choice of *self-restrain*. Therefore, empirically, our strategy is to estimate the unconstrained cost function first and then to account for systematic deviations due to CSR behavior in the error term. Firms may deviate from the benchmark, equation (1), either due to random noise v or due to systematic reasons u implied by the restriction as in equation (2). Choosing a flexible functional form, the translog, we write a reduced form as:

$$\begin{aligned} \ln C_{it} = \alpha &+ \sum_{j=1}^{2} \beta_j \ln w_{ijt} + \gamma_1 \ln y_{it} + \sum_{j=1}^{2} \frac{1}{2} \beta_{jj} \ln w_{ijt}^2 + \frac{1}{2} \gamma_2 \ln y_{it}^2 \\ &+ \sum_j \sum_k \delta_{jk} \ln w_{ijt} \ln w_{ikt} + \sum_{i=1}^{2} \theta_j \ln w_{ijt} \ln y_{it} \\ &+ \eta_1 t + \eta_2 t^2 + \eta_{1j} \ln w_j t + \rho IND + \epsilon_{it}., \end{aligned} \tag{3}$$

In addition to interaction terms of firm i in year t, we add a time-trend t to account for technical change and time effects. We also include a set of industry dummies IND as to account for systematic cost differences that are not due to the (different) social stance of firms. Please note that the error term is separated into two components and since cost inefficiency entails above-optimal costs, u is added to random noise: $\epsilon = v + u$.

To identify the portion of total estimation error attributable to random noise and inefficiency, respectively, we employ stochastic frontier analysis to obtain parameters in equation (3) (Kumbhakar and Lovell, 2000). Numerous business and economics studies use this method and attribute deviations from estimated optimal cost and/or profits in the vein of Leibenstein (1966, 1978) to investigate managerial inefficiency.

To identify potential inefficiency, we follow the convention in the literature and assume that u is i.i.d. and drawn from a half-normal distribution with expected value of zero.[1] After imposing the required homogeneity and symmetry restrictions, equation (3) is estimated using a two-step maximum likelihood (ML) procedure. First, we obtain starting values for slope parameters, intercept and the error term from OLS. This serves as a first test whether firms deviate from optima systematically in the first place, since errors would otherwise be white noise only (Waldmann, 1982). Second, we re-parameterize error term components $\lambda = \sigma_u/\sigma_v$, the ratio of inefficiency to random noise variance, and $\sigma = \sigma_u + \sigma_v$ as in Greene (2005). Paired with the use of OLS estimates as starting values in the ML estimation, we are then able to identify either error component. Firm-specific point estimates of cost efficiency (CE) are then obtained as in Jondrow et al. (1982) as the conditional mean of u_i given total error ϵ_i.

One approach to relate social responsibility scores to firm-specific inefficiency is to regress the former on the latter in a separate estimation stage. We refrain from this approach for two reasons. First, inefficiency scores are by assumption non-normally distributed and bounded at one from below.[2] This implies

[1] Stochastic frontier analysis has been developed by Aigner (1974), Battese and Corra (1977) and Meeusen and Van Den Broeck (1977) and is used widely in many fields of economics and finance. An introductory text to SFA is Coelli et al. (2005).
[2] Note that virtually all efficiency studies convert inefficiency measures into efficiency measures between zero and one by calculating $exp(-u_{it}|\epsilon_{it})$. This approach suggested in Jondrow et al. (1982) allows to interpret resulting efficiency scores

that any second stage approach would require either a transformation of this dependent variable or an adequate estimator to account for the truncated nature of the variable. Second, and more important, to estimate equation (3) consistently and efficiently, one needs to assume that u is independent of both v and the regressors in the deterministic kernel of the frontier. Regressing the result from this analysis in a second stage on further covariates is then, to put it in terms of Kumbhakar and Lovell (2000), 'schizophrenic' and would yield inconsistent estimates.

Therefore, we follow Kumbhakar et al. (1991) and Greene (2005) and estimate determinants of the inefficiency distribution simultaneously with the frontier parameters. We specify a vector SR_i that considers social responsibility scores of firm i to shift the distribution of inefficiency. The frontier $C(y_{it}, w_{it}, t; \mathbf{b})$ is the same for all firms. But each firm's u_{it} now depends on SR_{it}. Inefficiency u_{it} is still *i.i.d.* but now drawn from the truncated distribution:

$$u_{it} \sim N|[(\mu + \theta' SR_{it}), \sigma_u^2]|, \tag{4}$$

as the ability of firms to reach the efficient frontier now depends on SR_{it}, i.e is explained by CSR indicators.

2.2 Profit efficiency

To economically rationalize socially responsible behavior, CSR must not only result in costs but also bear some benefits. We assume that CSR is valued by (some) consumers, resulting in a higher willingness to pay for the product if it is produced socially responsible. Equivalently, we can argue that at a given price the demand for a product is higher if it is produced socially responsible. We define a demand function $D(P, SR)$, as a function of price P and the index of social responsibility SR. We assume $D_P < 0, D_{SR} > 0$. Following (Lundgren, 2008), maximizing profits means:

$$\max_{P,SR} \pi = PD(p, SR) - C(w, D(P, SR), SR) \tag{5}$$

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as a percentage of optimal cost that would have sufficed to produce the observed production plan of the firm, e.g. 70%.

The first order conditions are given by:

$$D(P, SR) + (P - C_D(w, D(P, SR), SR))D_P(P, SR) = 0, \tag{6}$$

$$(P - C_D(w, D(P, SR), SR))D_{SR}(P, SR) - C_{SR}(w, D(P, SR), SR) = 0. \tag{7}$$

These equations can be rewritten as:

$$(P - C_D)/P = 1/\epsilon_D, \tag{8}$$
$$PD_{SR}/\epsilon_D = C_{SR}, \tag{9}$$

where we have dropped the arguments. Equation (8) is the familiar mark-up rule, where the Lerner index (P-C)/P relates to the elasticity of demand $\epsilon_D = -D/(PD_P)$. Equation (9) shows that there is a positive effect of CSR in terms of revenues and a negative effect of CSR in terms of costs. In the optimum profit frontier, equation (5), the marginal benefits of CSR $PD_{SR}/\epsilon_D > 0$ are balanced with the marginal costs of CSR $C_{SR} > 0$. Thus, from this approach, it becomes very clear how social responsibility can be part of the firm's strategy: The analysis shows that even if a firm is cost-inefficient, it can be profit-efficient. Firms that do not engage in CSR might therefore be less profit efficient compared to socially responsible firms. Note that a firm can also be 'too responsible', indicating that the marginal costs dominate marginal revenues. Therefore, some responsible firms can also be profit-inefficient. This is in contrast to cost-inefficiency, where the relationship with CSR is monotonic.

We specify a profit frontier based on equation (5) and test if some firms deviate systematically from optimal profits, i.e. are profit inefficient when neglecting CSR. Analogous to the cost case, we then augment the model such that profit inefficiencies depend on CSR indicators. It follows from equations (8) and (9) that firms possess some market power on the output side. In contrast to a model of perfect in- and output market competition, we follow the alternative profit model suggested by Humphrey and Pulley (1997). Firms maximize profits by demanding factors at given prices w, but are able to set prices within the confinements of a pricing opportunity set $H(\bullet)$. This means that the optimal profit frontier arguments are identical to those in equation (3) because firm profits depend on factor cost and output quantities supplied. The only change applies to the dependent variable, which is now the log of profits $\ln \pi$. In contrast to the cost frontier, profit inefficiency is subtracted from the random noise component, $\epsilon = v_{it} - u_{it}$, since suboptimal realization of profits leads to

lower than optimal profits. To control for the social responsibility stance of firms (i.e. their CSR performance), we estimate profit inefficiency analogous to the cost specification conditional on according indicators SR_{it} in equation (4). We write a reduced form as:

$$\begin{aligned}\ln \pi_{it} = \alpha + \sum_{j=1}^{2} \beta_j \ln w_{ijt} + \gamma_1 \ln y_{it} + \sum_{j=1}^{2} \frac{1}{2} \beta_{jj} \ln w_{ijt}^2 + \frac{1}{2} \gamma_2 \ln y_{it}^2 \\ + \sum_j \sum_k \delta_{jk} \ln w_{ijt} \ln w_{ikt} + \sum_{i=1}^{2} \theta_j \ln w_{ijt} \ln y_{it} \\ + \eta_1 t + \eta_2 t^2 + \eta_{1j} \ln w_j t + \rho IND + \epsilon_{it}.,\end{aligned} \tag{10}$$

3 Data

We collect data from three different sources. The availability of social responsibility indicators as well as cost and profit function arguments determine the dimensions of our data and we analyze an unbalanced panel of 11,456 observations between the period 1991 and 2004. We obtained data on social responsibility from KLD Research & Analytics, Inc. and financial performance measures for each firm from Datastream. KLD uses screens to monitor SRI and it has expanded its universe of coverage over the last couple of years. In the 1990s, it covered the S&P500 Index and the Domini 400 Social Index. In 2001 the database was extended to include all constituents of the Russell 1000 Index as well. In 2003 the database was further extended to include all stocks from the Russell 2000 as well. KLD does not have historical ratings data available for non-US companies, unless it is a member of the S&P500. In our study we include all stocks covered by KLD. The frequency across scores and categories is depicted in table A.4.

[Insert Table A.4 about here]

KLD uses multiple criteria on which firms are evaluated using both positive and negative screens. Positive screens indicate strengths and negative screens indicate concerns regarding the firm. Each screen can be summarized in a binary variable, which reflects whether the firm meets the particular criterion and which are awarded at the end of each calendar year. The screens are sum-

marized in groups of corresponding items referring to a general theme. Six themes are identified: Community involvement, Corporate governance, Diversity, Employee relations, Environment, and Product. The first theme involves how the firm interacts with its social environment. Corporate governance relates to how the firm is governed and directed. Diversity is about the composition of the workforce, especially senior management and the board. Related to this is Employee relations which is about the relationship between the company and its employees and in particular concerns issues regarding employee compensation. Environment is about environmental management and policies. Finally, the theme Product is about strengths and concerns in relation to the quality of the products of the firm. With respect to all six themes, KLD investigates both strengths and concerns. [3]

KLD's ratings are among the oldest and most influential and are the most widely analyzed by academics. Sharfman (1996) discusses the validity of these ratings and concludes that the KLD ratings correlate sufficiently with other measures of corporate social performance. He concludes (p.295) that "researchers interested in studying corporate social performance can have confidence in the KLD measures and feel secure in the idea that the this new data does tap into the core of the social performance construct." Other researchers have used these databases too when investigating the relationship between social and financial performance (e.g. Graves and Waddock, 1994; Berman et al., 1999; Hillman and Keim, 2001; Becchetti et al., 2005). Waddock (2003) concludes that the KLD data can be referred to as '... the de facto research standard at the moment'. Chatterji et al. (2007) examine how well KLD ratings provide transparency about past and likely future environmental performance. They conclude that the 'concern' ratings are fairly good summaries of past environmental performance. They also find that firms with more concerns have more pollution and regulatory compliance violations in later years. Furthermore, they find that the strengths do not accurately predict pollution levels or compliance violations. However, given that the data are used a lot in practical

[3] Apart from these six themes, KLD also investigates companies' behavior with respect to human rights. However, as this is undertaken since the year 2000 only, we do not include this item in our analysis because it would result in a substantial reduction of the data available for our analysis. Furthermore, KLD has exclusionary screens for alcohol, gambling, firearms, military, nuclear power, and tobacco. Given the nature of these screens, namely focusing only on concerns, it is excluded from our analysis (see www.kld.com).

analysis and that proper alternatives are missing, we will use the KLD data in our model estimations.

Next, we collect firm-specific financial accounting data from Datastream to construct proxies for cost and profit as well as a proxy for output and fixed capital to estimate cost and alternative profit frontiers, respectively. We approximate the price of fixed capital equals capital expenditures divided by property, plant, and other fixed capital. We approximate the output of the firm with net sales. [4] As dependent variables for C and π, respectively, we use operating expenses and operating income. Descriptive statistics are given in table A.5.

[Insert Table A.5 about here]

Most SFA studies approximate the price of labor as the ratio of personnel expenses and employees. Since Datastream does not cover the latter very well, we approximate the exogenous price of labor differently. For each industry, we use the marginal product of labor estimate provided by the Groningen Growth and Development Center in the EU Klems dataset. [5]

4 Results

First, we test if the assumption of systematic deviations from optimal costs and profits, respectively, is supported by the data. Results from log likelihood ratio tests are shown in table A.1 in the appendix. [6] They show that the

[4] The number of alternative output concepts is vast and discussed in, for example McGuckin et al. (2005). We tested for alternatives such as cost of goods sold with no major implications for our main results.

[5] The data is publicly available at http://www.euklems.net/. See O'Mahony and Timmer (2009) for a detailed description of the database and implications for productivity and Ark et al. (2008) for an analysis of convergence among European countries and industries. While we account in the estimation of the reduced form in equation (3) for five aggregate industry classifications to avoid overspecification, this database provides detailed estimates for all 98 industries that we can distinguish on the basis of NACE codes (version 3).

[6] Two tests are of particular importance. First, recall that we assume a composed error term such that $\lambda = \sigma_u/\sigma_v$ denotes the ratio of inefficiency to random noise variance, and $\sigma = \sigma_u + \sigma_v$. Hence, both cost and profit frontiers nest simple OLS

specification of a frontier to account for systematic deviations is supported. These deviations are conventionally coined inefficiency. Here, we hypothesize that (part) of these deviations in fact represent the firm's social responsibility choices.

4.1 Aggregate CSR effects on inefficiency

Consider first the relation between deviations from optimal cost and aggregate CSR strengths and concerns, respectively, that is depicted in the first two columns of table A.6.[7] Aggregate measures are the sum of individual CSR dimensions and we find that firms forego on average around 45 percent of potential cost savings and realize also only around 55 percent of their optimal profits.

We showed in section 2 that the relation between CSR and cost (in)efficiency is monotonic. Specifically, firms that are considered strong in terms of CSR are those that abstain the most from exploiting the technically available production set. More self-restrain is therefore expected to be positively related to cost inefficiency. Likewise, firms scoring high on CSR concerns should in general exhibit a negative relation with the cost inefficiency distribution. The aggregate CSR strengths parameter is in line with expectations. But the aggregate CSR concern estimate is significantly positive and thus at odds with our expectations. This may reflect contradicting effects of different CSR concern dimensions as they are defined in the KLD data, which suggests a separate assessment of the individual CSR scores is warranted.

The necessity to dissect different CSR dimensions' effects regarding efficiency is even more apparent from the profit frontier estimates. The second pair of columns in table A.6 shows no significant relation between aggregate CSR scores with profit inefficiency. But note that it is likely that some individual CSR dimensions will offset each other. For example, 'Employee' concerns in-

functions if $\sigma_u = 0$. The first line in the upper and lower panel of table A.1 tests a simple frontier without time trend parameters in the kernel (equation (3)) and CSR strengths or concerns in the error distribution (equation (4)) versus an average response function without a composed error term. The latter is rejected at the 1-percent level.

[7] We also estimate cost and profit frontiers where CSR strengths and weaknesses are specified separately. According results are shown in tables A.2 and A.3.

clude large scale lay-off's, which immediately reduce labor cost and increase profits. But this reducing effect on profit inefficiency might be offset by 'Community' concerns, which include, among others, investment controversies associated with substantial legal fees. Such contradicting effects may then yield insignificant results for aggregate CSR scores.

[Insert Table A.6 about here]

Therefore, we dissect the relation between individual CSR strengths and concern dimensions with efficiency. The two rightmost pairs of columns in table A.6 illustrate the importance to assess KLD's CSR scores individually. For example, the effect of community strength, which includes in particular charitable and innovative donations as well as housing and educational support by the firm, turns insignificant when considering community (and other) concerns at the same time. Hence, firms appear to offset some of their socially motivated (lack of) actions, yielding no significant net effect regarding their ability to attain their optimal cost level under the unconstrained production set.

The third pair of columns in table A.6 further shows that all four remaining dimensions of social strengths yield the expected positive coefficient. Especially higher scores in the 'Employee' and 'Product' dimension increase the inefficiency of the firm. But the estimates of CSR concerns on inefficiency are less straightforward. First, only three of the five scores are statistically significant. Only more 'Employee' concerns yield the expected negative effect on cost inefficiency. But more concerns regarding 'Products' and especially 'Environment' in fact appear to increase the cost inefficiency of the firm. With respect to the former, product concerns capture primarily fines or civil penalties related to product safety, contracting controversies, or antitrust matters. Related, two of the criteria to score high in the environmentally hazardous dimension, toxic waste and regulatory problems, capture fines recently paid by the company, too.[8] These events directly increase the firm's cost, which renders a firm relatively inefficient compared to peers with similar production plans.

[8] The remaining criteria are more descriptive in nature and include: Ozone Depleting Chemicals, Substantial Emissions, Agricultural Chemicals, Climate Change, Other Concerns (see table A.4).

Whereas employee, product, and environmental strengths and concerns are important determinants of cost (in)efficiency, the effects of CSR strengths on profit efficiency are limited to community and, to a lesser extent, diversity. Higher scores in either dimension reduce systematic deviations from optimal profits. Note that for instance the former results corroborates our model's predictions that the relation between CSR and cost efficiency is monotonic but the relationship between CSR and profit efficiency is not. In the KLD scoring, strong community involvement implies higher and sustained spending and support. This inevitably leads to higher costs of a socially responsible firm compared to peers, and hence to cost inefficiency. But the significantly negative coefficient for profit efficiency underpins that these expenditures are compensated by higher revenues. This suggests that strong corporate social responsibility, at least as far as community efforts and a diverse workforce are concerned, are conscious and economically rational choices of the firm as to maximize profit generating abilities relative to peers, potentially by generating a better image among both it's (local) customers and by it's workforce treatment.

Baron (2001) argues that CSR activities can reflect different motives: altruism, strategic choices to maximize profits, and attempts to enhance the image of the firm without significant changes in business conduct, often referred to as 'greenwash'. A comparison of CSR strengths' parameters for both cost and profit efficiency scores relates our results to these three possible motives. Pronounced efforts regarding strengths in the 'Community' dimension are an example of 'greenwash'. Here, firms' efforts do not significantly increase their costs but reduce their inability to generate maximum profits. This also holds for firms 'Diversity' actions to enhance their strengths. But now the relative ability to minimize costs is reduced significantly as indicated by a significantly positive coefficient on cost inefficiency. Hence, firms appear to consciously choose to incur more costs compared to peers operating in a none(-self-)constrained production set. But they behave strategic since this investment in CSR yields at the same time a (larger) reduction of profit inefficiencies.

The cost inefficiency increasing effects of the remaining three strengths dimensions paired with insignificant consequences for firms' abilities to realize unconstrained maximum profits can be due to two different reasons. First, firms might have decided to treat their staff generously without necessarily aiming to reap rents on the revenue side that compensate them for it. But,

according to Baron (2001), altruism implies not only significantly higher cost, but also lower profits relative to unconstrained peers. Paired with insignificant effects for profit efficiency, the results regarding CSR strengths due to altruistic motives therefore appear relatively weak. Instead, secondly, they may simply reflect strategic behavior since cost inefficiencies increased in our relative peer comparison, but the profits were not significantly lower.

Whereas community strengths have the economically and statistically most important effect on profit efficiency, concerns regarding human capital, the 'Diversity' and 'Employee' dimensions, reduce profit efficiency significantly. This result is in line with a number of studies that emphasize the crucial importance of personnel as a critical factor of sustained corporate success (see Hirsch (1991); Carroll and Niehaus (1998)). Poor treatment of the labor force may reduce labor costs in the short run. But our results suggest that such a policy may lead to a firm's failure to attract the most talented staff necessary to outperform peers in the profit generating dimension.

In sum, both CSR strengths and concerns significantly determine systematic deviations from optimal costs and profits, traditionally coined 'inefficiency'. However, the specific factors determining cost and profit inefficiency differ. We find that social efforts (or 'sins') of firms may indeed increase (reduce) the cost efficiency of the firm while reducing (increasing) their performance regarding the ability to realize optimal profits.

4.2 Inefficiency levels and CSR intensity

Our results are in line with the theoretical conjecture that the relation between CSR and cost efficiency is monotonic while social efforts can increase the profit efficiency of firms up to a certain maximum but may be excessively high thereafter. We investigate next in more detail the relation between cost and profit efficiency levels across the score distribution of statistically significant CSR variables. We conjecture that firms exhibiting little signs of CSR should incur lower costs and therefore exhibit higher efficiency relative to peers given production plans. Figure A.1 depicts box plots for cost efficiency scores across CSR concerns that affect the inefficiency distribution significantly. While the relation between cost efficiency and increasingly severe concerns regarding employees does not yield a clear-cut increasing trend,

larger environmental and product concerns coincide with increasing median cost efficiency. For instance, median cost efficiency is around 55 percent for firms scoring zero on environmental concerns, but the last decently populated group number 4 yields median cost efficiency of 65 percent.[9] Hence, in line with the model shown in section 2, firms classified by KLD as socially cumbersome enjoy lower systematic deviations from minimal costs given the unrestricted production set.

[Insert Figure A.1 about here]

However, figure A.2 shows that firms pursuing strategies that yield more pronounced CSR strengths do not incur lower cost efficiencies as we suspected. The relation between cost efficiency and higher spending associated with better CSR strengths scores is fairly flat and sometimes even increases substantially. The latter is especially the case for the 'Diversity' and 'Employee' dimensions, respectively. An explanation for our finding of higher cost efficiency due to higher scores may result from the measurement of strengths in these dimensions. For instance in the former dimension, it is the presence of female executives or board members as well as particularly favorable promotion objectives fostering female advancement that score high. But there is also ample evidence that equally qualified female executives earn lower wages compared to their male peers (Mohan and Ruggiero, 2003; Bowlin and Renner, 2008). To the extent that one is willing to extent this 'glass-ceiling' compensation gap argument to other minorities that score high on CSR strengths, strong CSR firms in this dimension enjoy the benefits of capable managers at lower cost, which would render them more cost efficient compared to their peers.

[Insert Figure A.2 about here]

In contrast to the relation between CSR and cost efficiency, profit efficiency may benefit from improving CSR strengths and reducing CSR concerns up to a certain point but decline thereafter. As shown in equations (8) and (9), optimal

[9] See table A.4 for the according frequency distribution across scores. The boxes in the depicted plots stretches from the lower hinge (25^{th} percentile) to the upper hinge (75^{th} percentile). The median is shown as a line across the box. Therefore the box contains the middle half of the scores in the distribution. The "H-spread" is defined as the difference between the hinges and a "step" is defined as 1.5 times the H-spread. Upper (lower) adjacent values are one step above (below) the lower (upper) hinge.

CSR requires the firm to balance the marginal benefits and costs. Theory and estimated parameters lead us to expect that profit efficiency increases (decreases) with more CSR strengths (concerns), but it decreases (increases) when pursued 'excessively' by the firm.

[Insert Figure A.3 about here]

Figure A.3 shows the median as well as the 25^{th} and 75^{th} percentile of the profit efficiency distribution across CSR scores of indicators identified as significant deviation determinants. Especially for increasingly high scores of diversity strengths, we find increasing median profit efficiency. However, this declines beyond a certain maximum level. For instance, median profit efficiency increases up to 75 percent for diversity scores of 5, but it reverts back to median values of 60 percent for higher CSR, as in the case of very low diversity. Hence, hiring and promoting minority groups may boost firms ability to generate profits, perhaps due to superior consensus reaching abilities of executives with very different ethnic backgrounds or simply much higher motivation among well-compensated and appreciated senior staff. But too large differences among staff members are counter-productive. Thus, aligning very diverse points of view represented by a large number of interest groups does not only bring about gains from the consideration of different viewpoints. It also implies higher coordination costs. This can prove to be value destroying if decisions are taken only halfway or with substantial negotiation delays.

We also observe a U-shaped relation between profit efficiency across CSR concern scores, especially in the employee dimension. Very little and very high concerns both do coincide with higher levels of profit efficiency, thus corroborating the non-linear relation between CSR and profit generating ability. Note, however, that very high CSR indicator values for either strengths or concerns are rare. Thus, whereas the significance of efficiency differences across different scores is subject to careful interpretation, we infer that our results are in line with theoretical predictions regarding the linear relation concerning cost and the non-monotonic relation concerning profit efficiency and CSR, respectively.

5 Conclusion

Why do firms behave socially responsible? Is it mere windowdressing, is it altruism, or are strategic issues involved? To answer this question, we model firms to face a production opportunity set, which they may decide not to exploit fully. Instead, firms can constrain themselves in their actions. We show that, as such, increasing corporate social responsibility (CSR) univocally leads to systematically higher costs compared to peers. But CSR enhancements may also represent investment choices of the firm to increase profits. We relate our findings to the tripartite distinction of CSR motives: altruism, strategic, or 'greenwash', suggested by e.g. Baron (2001) and Lyon and Maxwell (2007).

We test these conjectures empirically by using an approach that allows specifically to estimate systematic deviations: stochastic frontier analysis. Numerous business and economics studies use this method and attribute deviations from estimated optimal cost and/or profits in the vein of Leibenstein (1966, 1978) to managerial inefficiency. Here, we condition the distribution of these systematic deviations on CSR measures collected by Kidder, Lydenberg and Domini for 2,862 corporations during the period 1991-2004 and use estimated (in)efficiency as a proxy for firms' social stances.

Our results confirm theoretical predictions with respect to a non-monotonic relation between CSR and the ability to generate profits. Increasing (reducing) social strengths ('sins') up to a certain point enhances firms relative ability to generate profits compared to irresponsible peers. But beyond a certain threshold, further CSR efforts result in declining profit efficiency. Cost efficiency is also affected by CSR. However, the dimensions that determine the former significantly differ from those that influence profit efficiency. Basically, we find that employee, product, and environmental strengths and concerns determine cost inefficiency, whereas community and diversity impact on profit efficiency. Moreover, the relation between cost efficiency and CSR levels appears to be monotonous as predicted by theory, but is not always clearly increasing in CSR scores.

The effect of different CSR dimensions on either cost or profit efficiency provides little evidence of 'greenwash' as the main motive for CSR. Only efforts ('sins') regarding firm's scores in the 'Community' dimension show univocally neither significant effect on cost nor on profit efficiency. This suggests that

efforts of firms geared towards a better standing in the community are likely to be primarily motivated by windowdressing strategies. All other activities in the remaining strengths dimensions, however, do increase cost inefficiencies. Since the effect on profits is also either positive or at least not significantly negative, we may consider our results to be evidence in favor of strategic motives dominating CSR strengthening behavior. Therefore, we conclude that firms appear to behave socially not to greenwash or for altruistic reasons, but primarily because of strategic considerations (i.e. profits).

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Appendix A Specification tests

Table A.1
Stochastic frontiers versus nested frontiers and OLS

H_0	**Log-likelihood**		χ^2	**Critical**	**p-value**	**d.f.**
	Rest.	Unrest.		**value**		
Cost frontier						
No inefficiency	-7,041.7	-7,007.8	67.97	6.635	0.000	1
No time trend	-7,007.8	-6,467.6	1080.43	13.277	0.000	4
No concerns	-6,467.6	-6,159.4	616.39	16.812	0.000	6
No Strengths	-6,467.6	-6,217.9	499.34	16.812	0.000	6
Neither concerns nor strengths	-6,159.4	-6,089.9	138.98	15.086	0.000	5
Profit frontier						
No inefficiency	-13,136.3	-12,602.9	1066.86	6.635	0.000	1
No time trend	-12,602.9	-12,480.3	245.16	13.277	0.000	4
No concerns	-12,480.3	-12,220.2	520.24	16.812	0.000	6
No Strengths	-12,480.3	-12,198.2	564.18	16.812	0.000	6
Neither concerns nor strengths	-12,220.2	-12,156.6	127.08	15.086	0.000	5

Notes: Log-likelihood ratio tests with critical χ^2 values at the 99^{th} percentile.

Table A.2
Frontier estimates and aggregate CSR effects

Dependent variable	**Cost frontiers**						**Profit frontiers**					
Observations	**11,456**						**10,352**					
Log likelihood	**-6,179**		**-6,219**		**-6,170**		**-12,237**		**-12,277**		**-12,237**	
	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*
Intercept	3.868	0.000	2.601	0.000	3.841	0.000	-2.194	0.000	-1.413	0.011	-2.202	0.000
$\ln y$	0.303	0.000	0.473	0.000	0.299	0.000	1.108	0.000	0.991	0.000	1.107	0.000
$\ln(w_1/w_2)$	-0.406	0.000	-0.379	0.000	-0.383	0.000	-0.454	0.000	-0.398	0.000	-0.442	0.000
$\ln(w_1/w_2)^2$	0.076	0.000	0.076	0.000	0.073	0.000	0.125	0.000	0.119	0.000	0.124	0.000
$\ln y^2$	0.041	0.000	0.030	0.000	0.042	0.000	-0.019	0.000	-0.010	0.024	-0.019	0.000
$\ln(w_1/w_2) \times \ln y$	0.047	0.000	0.045	0.000	0.046	0.000	0.037	0.000	0.034	0.000	0.036	0.000
t	-0.115	0.000	-0.114	0.000	-0.112	0.000	-0.089	0.000	-0.092	0.000	-0.088	0.000
t^2	0.000	0.412	0.001	0.003	0.000	0.432	-0.002	0.001	-0.003	0.000	-0.002	0.001
$\ln(w_1/w_2) \times t$	-0.004	0.002	-0.004	0.005	-0.005	0.001	0.008	0.001	0.007	0.006	0.008	0.002
$\ln y \times t$	0.006	0.000	0.005	0.000	0.006	0.000	0.006	0.000	0.007	0.000	0.006	0.000
μ	4.392	0.000	28.322	0.011	3.564	0.000	-60.731	0.115	-211.207	0.595	-61.448	0.120
CSR - aggregate strengths	1.291	0.000			0.387	0.000	-5.133	0.392			-0.030	0.962
CSR - aggregate concerns			2.054	0.153	1.112	0.000			-1.740	0.791	-5.078	0.398
λ	3.082	0.000	7.986	0.003	3.030	0.000	12.326	0.081	21.569	0.083	12.255	0.085
σ	1.175	0.000	2.772	0.003	1.150	0.000	6.651	0.083	11.704	0.084	6.659	0.087
Mean Efficiency	0.531		0.505		0.555		0.571		0.572		0.571	
SD Efficiency	0.140		0.149		0.140		0.189		0.188		0.189	

NNotes: 2,862 firms. Industry dummies included but not reported. $\lambda = \sigma_u + \sigma_v$ and $\sigma^2 = \sigma_u^2 + \sigma_v^2$; y: output measured as net sales; w_1: price of fixed capital measured as capital expenditures relative to net property, plant, and equipment capital in percent; w_2 labor compensation per industry from the EU-KLEMS database (http://www.euklems.net). CSR strengths and concerns as in table A.4.

Table A.3
Frontier estimates and dissected CSR effects

Dependent					**Cost**						**Profit**	
Observations					**11,456**						**10,352**	
	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*
Intercept	3.647	0.000	3.432	0.000	3.142	0.000	-2.201	0.000	-1.520	0.006	-2.185	0.000
$\ln y$	0.329	0.000	0.350	0.000	0.387	0.000	1.110	0.000	1.016	0.000	1.112	0.000
$\ln(w_1/w_2)$	-0.339	0.000	-0.338	0.000	-0.327	0.000	-0.435	0.000	-0.441	0.000	-0.457	0.000
$\ln(w_1/w_2)^2$	0.073	0.000	0.080	0.000	0.076	0.000	0.122	0.000	0.120	0.000	0.122	0.000
$\ln y^2$	0.040	0.000	0.040	0.000	0.037	0.000	-0.019	0.000	-0.013	0.004	-0.020	0.000
$\ln(w_1/w_2) \times \ln y$	0.044	0.000	0.041	0.000	0.041	0.000	0.036	0.000	0.038	0.000	0.038	0.000
t	-0.116	0.000	-0.107	0.000	-0.110	0.000	-0.091	0.000	-0.090	0.000	-0.087	0.000
t^2	0.000	0.584	0.001	0.037	0.000	0.651	-0.002	0.000	-0.002	0.000	-0.002	0.000
$\ln(w_1/w_2) \times t$	-0.006	0.000	-0.004	0.007	-0.005	0.000	0.008	0.002	0.007	0.006	0.007	0.002
$\ln y \times t$	0.006	0.000	0.005	0.000	0.005	0.000	0.006	0.000	0.006	0.000	0.006	0.000
μ	3.352	0.000	4.639	0.000	3.073	0.000	-44.256	0.040	-51.838	0.050	-30.467	0.005
Strengths												
Community	0.887	0.026			0.505	0.148	-12.441	0.033			-7.189	0.004
Diversity	0.212	0.070			0.244	0.027	-3.917	0.042			-2.473	0.009
Employees	2.198	0.000			1.832	0.000	-1.245	0.297			-0.502	0.510
Environment	0.975	0.000			0.642	0.005	-0.491	0.746			0.046	0.963
Product	2.329	0.001			2.026	0.001	-0.339	0.867			-0.726	0.598
Concerns												
Community			-0.472	0.600	-0.296	0.694			-6.724	0.173	-4.786	0.100
Diversity			-0.195	0.221	-0.057	0.664			4.639	0.056	1.696	0.080
Employees			-0.863	0.000	-0.730	0.000			8.880	0.046	5.920	0.004
Environment			2.059	0.001	1.402	0.000			-1.928	0.142	-1.009	0.166
Product			1.397	0.001	0.745	0.001			-11.799	0.290	-6.249	0.115
λ	2.877	0.000	2.918	0.000	2.910	0.000	10.504	0.019	10.722	0.026	8.703	0.001
σ	1.093	0.000	1.123	0.000	1.087	0.000	5.684	0.020	5.795	0.028	4.674	0.001
Mean efficiency	0.549		0.503		0.562		0.571		0.582		0.573	
SD efficiency	0.139		0.138		0.140		0.189		0.188		0.190	

Notes: 2,862 firms. Industry dummies included but not reported. $\lambda = \sigma_u + \sigma_v$ and $\sigma^2 = \sigma_u^2 + \sigma_v^2$; y: output measured as net sales; w_1: price of fixed capital measured as capital expenditures relative to net property, plant, and equipment capital in percent; w_2 labor compensation per industry from the EU-KLEMS database (http://www.euklems.net). CSR strengths and concerns as in table A.4.

Table A.4
Frequency of social indicators per category 1991 to 2004

	Concerns					*Strengths*				
	Product	Environment	Employee	Diversity	Community	Product	Environment	Employee	Diversity	Community
0	9,318	9,162	8,115	8,642	10,941	10,167	9,421	8,408	7,521	9,581
1	1,609	1,200	2,879	2,769	498	1,221	1,721	2,259	2,357	1,367
2	384	662	427	45	17	67	273	653	937	429
3	119	308	32	0	0	1	35	122	421	74
4	26	97	3	0	0	0	6	13	143	5
5	0	25	0	0	0	0	0	1	49	0
6	0	2	0	0	0	0	0	0	23	0
7	0	0	0	0	0	0	0	0	5	0

Notes: 2,862 firms; 11,456 observations. The dimensions of evaluation contain the following elements, respectively: **Product strengths:** Quality, R&D/ Innovation, Benefits to Economically Disadvantaged, Other Strength; **Product concerns:** Product Safety, Marketing/Contracting Controversy, Antitrust, Other Concern; **Environment strength:** Beneficial Products and Services, Clean Energy, Communications, Pollution Prevention, Recycling; **Environment concerns:** Hazardous Waste, Regulatory Problems, Ozone Depleting Chemicals, Substantial Emissions, Climate Change, Other Concern; **Employee** relations strengths: Cash Profit Sharing, Employee Involvement, Health and Safety Strength, Other Strength; **Employee** relation concerns: Union Relations, Health and Safety Concern, Workforce Reductions, Retirement Benefits Concern, Other Concern; **Diversity strengths:** CEO, Promotion, Board of Directors, Work/Life Benefits, Women & Minority Contracting, Employment of the Disabled, Gay & Lesbian Policies, Other Strength; **Diversity Concerns:** Controversies, Non-Representation, Other Concern; **Community Strength:** Charitable Giving, Innovative Giving, Non-US Charitable Giving, Support for Housing, Support for Education, Other Strength; **Community Concerns:** Investment Controversies, Negative Economic Impact, Other Concern.

Table A.5
Descriptive statistics firm-level data 1991 to 2004

Variable		Mean	SD	Min	Max
Price of fixed capital	w_1	24.14	123.99	0.01	12,724
Price of labor	w_2	55.8	26.0	12.9	186
Operating expenses	C	4,916.8	12,900.0	4.45	271,000
Operating income	π	585.3	1,695.3	-13,400	35,900
Net sales	Y	5,505.5	14,200.0	0.03	285,000

Notes: 2,862 firms; 11,456 observations. Price of fixed capital is measured as capital expenditures relative to net property, plant, and equipment capital in percent. The price of labor is the compensation of labor per industry obtained from the EU-KLEMS database (http://www.euklems.net). The remaining variables are obtained from Datastream. All monetary measures are in thousands of deflated dollars.

Table A.6
Parameter and efficiency estimates cost frontier

	Aggregate CSR effects				Dissected CSR effects			
Dependent variable	**Cost**		**Profit**		**Cost**		**Profit**	
Observations	**11,456**		**10,352**		**11,456**		**10,352**	
Log likelihood	**-6,170**		**-12,237**		**-6,090**		**-12,157**	
	β	*p-value*	β	*p-value*	β	*p-value*	β	*p-value*
Constant	3.841	0.000	-2.202	0.000	3.142	0.000	-2.185	0.000
$\ln y$	0.299	0.000	1.107	0.000	0.387	0.000	1.112	0.000
$\ln(w_1/w_2)$	-0.383	0.000	-0.442	0.000	-0.327	0.000	-0.457	0.000
$\ln(w_1/w_2)^2$	0.073	0.000	0.124	0.000	0.076	0.000	0.122	0.000
$\ln y^2$	0.042	0.000	-0.019	0.000	0.037	0.000	-0.020	0.000
$\ln(w_1/w_2) \times \ln y$	0.046	0.000	0.036	0.000	0.041	0.000	0.038	0.000
t	-0.112	0.000	-0.088	0.000	-0.110	0.000	-0.087	0.000
t^2	0.000	0.432	-0.002	0.001	0.000	0.651	-0.002	0.000
$\ln(w_1/w_2) \times t$	-0.005	0.001	0.008	0.002	-0.005	0.000	0.007	0.002
$\ln y \times t$	0.006	0.000	0.006	0.000	0.005	0.000	0.006	0.000
μ	3.564	0.000	-61.448	0.120	3.073	0.000	-30.467	0.005
Aggregate CSR								
Strengths	0.387	0.000	-0.030	0.962				
Concerns	1.112	0.000	-5.078	0.398				
Dissected CSR								
Strengths								
Community					0.505	0.148	-7.189	0.004
Diversity					0.244	0.027	-2.473	0.009
Employees					1.832	0.000	-0.502	0.510
Environment					0.642	0.005	0.046	0.963
Product					2.026	0.001	-0.726	0.598
Concerns								
Community					-0.296	0.694	-4.786	0.100
Diversity					-0.057	0.664	1.696	0.080
Employees					-0.730	0.000	5.920	0.004
Environment					1.402	0.000	-1.009	0.166
Product					0.745	0.001	-6.249	0.115
λ	3.030	0.000	12.255	0.085	2.910	0.000	8.703	0.001
σ	1.150	0.000	6.659	0.087	1.087	0.000	4.674	0.001
Mean efficiency	0.555		0.571		0.562		0.573	
Standard deviation	0.140		0.189		0.140		0.190	

Notes: 2,862 firms. Industry dummies included but not reported. $\lambda = \sigma_u + \sigma_v$ and $\sigma^2 = \sigma_u^2 + \sigma_v^2$; y: output measured as net sales; w_1: price of fixed capital measured as capital expenditures relative to net property, plant, and equipment capital in percent; w_2 labor compensation per industry from the EU-KLEMS database (http://www.euklems.net). CSR strengths and concerns as in table A.4.

Figure A.1. Cost efficiency and CSR concerns

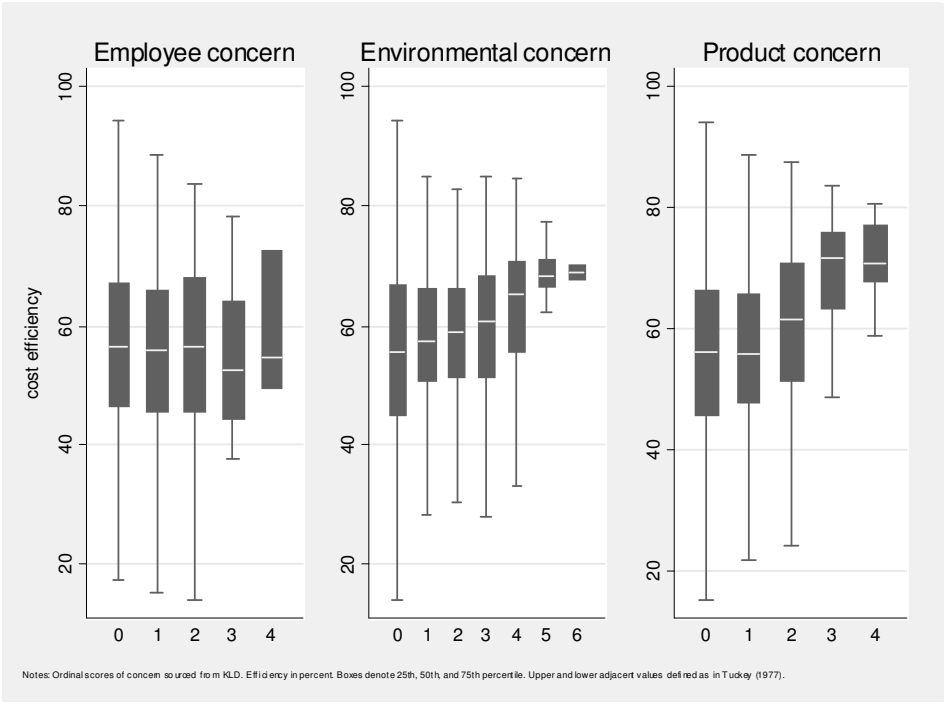

Figure A.2. Cost efficiency and CSR strengths

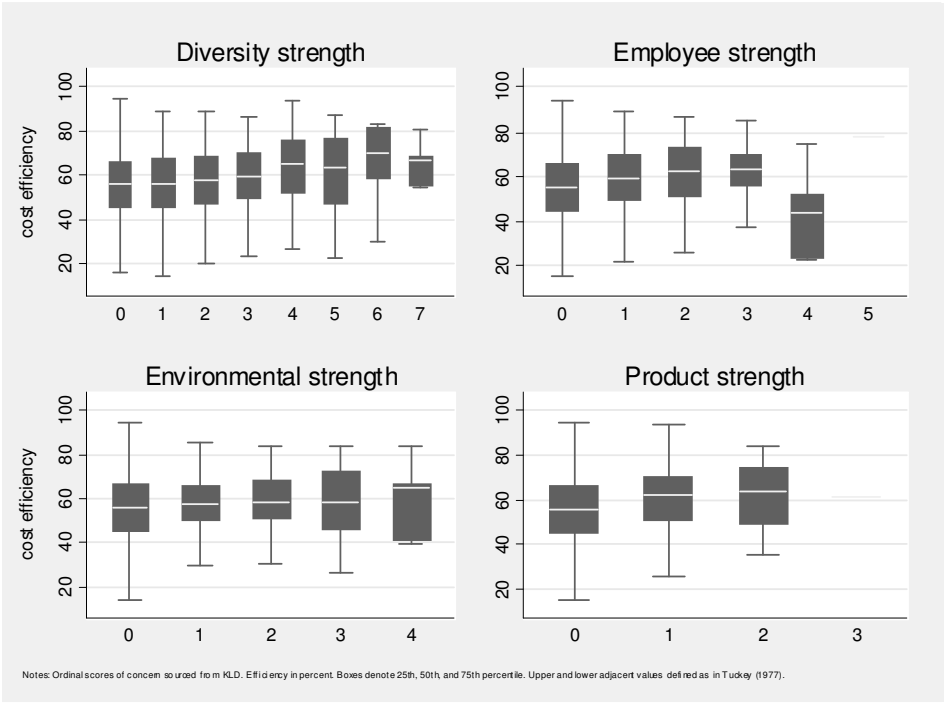

Figure A.3. Profit efficiency and CSR strengths and concerns