

René Böheim¹ and Claudia Hochgatterer²

¹Department of Economics Johannes Kepler University Linz, Austria
Email: rene.boeheim@jku.at

²Research Institute for International Taxation Vienna University of Economics and Business Administration, Austria
Email: claudia.hochgatterer@wu.ac.at

DOES CSR INCREASE FIRMS' PROFITS? EVIDENCE FROM DJSI FIRMS

Firms face complex market conditions, external effects and asymmetric information which may lead to market failure and sub-optimal profits. In the literature, market failures could build the theoretical base for CSR implementation by firms. In fact, firms in competitive markets could use CSR as management tool to gain more profits through diversification.

We examine the link between CSR and profit maximization by investigating 551 firms listed in the Dow Jones Global Index (DJGI) from 1997 to 2008. As some of these firms are also listed in the Dow Jones Sustainability Index (DJSI) which started in 1999, propensity score estimation techniques are implemented. This method is used to uncover the effect of CSR on the firms' profits and to identify the average treatment effect on the treated (ATT) of the inclusion in the DJSI. Overall, a positive relationship between CSR and the firms' profit seem to be confirmed by the study's outcome.

1 Introduction

Firms face complex market conditions, external effects and asymmetric information which may lead to market failure and sub-optimal profits. In the literature, market failures could build the theoretical base for Corporate Social Responsibility (CSR hereafter) implementation by firms. In fact, firms in competitive markets could use CSR as a management tool and may offer firms the opportunity to gain higher profits through diversification. The empirical evidence on this relationship is however not conclusive. Orlitzky et al. (2003), in a meta-study of 52 studies, investigate the relationship between costs and benefits of CSR and find that a positive relation between CSR and profits cannot be ruled out. However, the statistical significance and the returns to CSR depend strongly on the measures and the definition of CSR.

Orlitzky et al. (2003) differentiated their investigated studies by the implemented profit measures. The various studies in this field could also be categorized by their CSR measure. Environmental pollution control indices are used especially at the very beginning of the empirical CSR literature (see Folger and Nutt 1975; Spicer 1978; Chen and Metcalf 1980; and Shane and Spicer 1983). At the meantime, Vance (1975) used a ranking list of CSR behaving firms published by Moskowitz in 1972 as CSR measure. Many others like Mahapatra (1984), Waddock and Graves (1997), McWilliams and Siegel (2000), Nelling and Webb (2006), Waldmann et al. (2006), Alexander and Buchholz (1978), Ingram (1978), Cochran and Wood (1984), McGuire et al. (1988), and Balabanis et al. (1998) followed his idea and used the same or related rankings or ratings (e.g. KLD social rating, Business and Society Review Journal ranking, Fortune magazine's rating, and the rating of the New Consumer Group) to investigate the effect of such rankings or ratings on the firms' profits.

The disclosures on pollution controls, e.g. used by Belkaoui (1976), or questionnaires on managers' behavior and their CSR valuation, e.g. used by Zu and Song (2008), are less frequently implemented as CSR measures in this empirical context.

From this short overview of the various CSR measures differences in the study outcomes may arise due to the lack of an unique definition of CSR and its different concepts. Some concepts are more general models such as Carroll's (2004) "Pyramid of CSR" which combines the different expectations of the society and the qualification of management decisions or strategies in terms of the firms' situation. This contrasts to other authors, e.g., Grewe and Löffler (2006), who consider it from the viewpoint of a financial auditor focusing on the quantitative aspects of CSR.

The stakeholder theory of Freeman (1984) considers CSR as having a positive influence on profits because of its ability to integrate external effects. External effects itself must not lead to cost, especially when the source is not detectable for sure. According to Promberger and Spiess (2006), it is possible that ignoring external effects may lead to future costs (lawsuits, ...) and decrease future profits. Therefore, the integration or prevention of external effects should not lead to more costs than ignoring them. Further, McWilliams et al. (2006) describe CSR as a resource attribute like color, size, quality, ... which enables firms to gain sustainable competitive advantage with CSR over their competitors. The costs can be passed down to the customer by higher product prices and profits increase. The advantage could arise because of asymmetric information where CSR serves as signal for stakeholders to diversify a firm from its competitors.

Some of the previous studies in this field are suffering from misspecification, aggregation and/or omitted variable bias, which justify the need of further research. Our study on the correlation between CSR and the firms' profit differs from previous studies in various aspects. First it uses the Dow Jones Sustainability Index (DJSI) inclusion in the years 1999 and 2000 as proxy for CSR commitment of firms. The advantage of the DJSI is that it is constructed not only by experts on CSR but also of industry specific experts who are familiar with official documents and their true interpretation as well as with industry specific characteristics. Due to an extensive assessment procedure, ratings of established and reliable rating agencies like Standard and Poor's, KLD and the Dow Jones Group provide a better CSR proxy than those mentioned before. Our panel consists of 288 firms which are listed at least once in the DJSI in the years 1999 and 2000 with other 263 firms in the Dow Jones Index with firms' data of the Thomson's "datastream" data base to obtain the effect of the DJSI index inclusion on the firms' profit. The firms are observed two years before the DJSI inclusion from 1997 to 2008. This dataset contains a great range of different industries and countries.

Further, the actual study examines not only the short run but also the long run effects of CSR on firms included in the DJSI by using a propensity score estimation method trying to identify the average treatment effect (ATT) on the firms included in the DJSI. We analyze these firms to investigate which firm-specific characteristics determine the inclusion in the DJSI, whether or not we observe changes in firms' behavior on inclusion (moral hazard), and perhaps most important whether firms that were initially similar had different outcomes, depending on whether or not they were included in the DJSI. By trying to find good predictors for the DJSI listing the estimated ATT showed significant positive effects of CSR behavior of a firm which is again represented by an inclusion into the DJSI. Starting with the theoretical background in Section 2 discussing potential costs and benefits of CSR, Section 3 describes the employed data. Next, the empirical approach is outlined in Section 4 and is followed by the results presented in Section 5. The last Section concludes.

2 Background

In a time of growing integration of economies and immediate information transfer, corporate fraud and corruption will be brought forward and draws the world's attention. Carroll (2004) thinks that the demand on corporate business ethics and social responsibilities becomes a growing issue not only for governments and firms, it is an ethical debate which concerns the whole society. KLD Social Indexes, FTSE4Good Indexes, NAI (Natur Aktien Index), Dow Jones Sustainability Index, and the Austrian Vönix Index are reflecting a marketing trend of CSR. Although Promberger and Spiess (2006) find many firms already having some sort of corporate conduct which counts for the social environment since the 1970, a recent special report on CSR in *The Economist* (2008) points out that the actual boom is led by scandals at Enron, WorldCom and elsewhere undermined trust in big business. The report further claims that firms are more than ever facing a pressure to report not only their financial results, but also non-financial ones are a crucial factor for rankings and ratings on the financial markets. According to the microeconomic theory which assumes that management decisions are only driven by profit maximization, the question arises if doing good maximizes profits as well as doing business good, or even better?

2.1 Costs of CSR and potential benefits

From microeconomic theory, firms compete against each other on competitive markets with free entry and exit possibilities as well as full information. Firms themselves are defined as business entities, producing goods (y) by using different resources (x) such as labor, capital, and natural resources (including land) and combining them through different technologies and a specific production function $f(X)$. The inputs have different prices (p), the wage for labor (w), the interest rate (or dividend payments) for capital, and market prices for resources. As described by Varian (1984), by simultaneously finding the minimum of the cost function $c(w,y)=\min w*x$ and the maximum of the revenue function $r(p,y)=\max p*f(x)$ the following profit maximization:

$$\pi(p)=\max p*f(x) - w*x \quad (1)$$

can be calculated. The revenue function yields an exogenous given price of supplied goods according to the fact that in a perfect competitive market all firms are price takers. The optimal decision is the marginal costs equal the marginal revenues. No firm in this market is able to gain profits greater than zero (except the imputed entrepreneurial profit). Single firms can only decide on their quantity of supply but not the market price which is given for any firm.

In such a market, implementing CSR would increase costs and have no output-boosting or other significant profit maximizing effect. This is because all costs and consumer preferences are perfectly reflected by the market price. Although the changing preference of one consumer will not have a direct effect on the price, she can decide to buy the good at the market price or not. This consumption decision in fact has an impact on the amount of demanded goods. From the firm's perspective, a firm may use CSR to distinguish itself from its competitors. McWilliams and Siegel (2001) first formulate a formal theory-of-the-firm model which credit CSR with a profit maximizing attribute. They view CSR as a product's or firm's attribute similar to the productivity of employees which can be valued by the stakeholders. On this basis, the RBV of McWilliams et al. (2006) claims that because of the assumption of firms being a "bundle of heterogeneous resources and capabilities which are imperfectly mobile across firms"(p. 4), a firm may use their resources to gain sustainable competitive advantages. This adds CSR to the resources x and now an optimal value of CSR is granted through the optimization of the profit function from Equation (1). If then the marginal costs equals or exceeds the given market price, the firm will enter the market or stays into business if it has already entered.

This contrasts to the classical microeconomic theory of the firm. Friedman (1970) believes that from the classical microeconomic point of view CSR is not a desirable management issue because only the government is responsible for social/environmental issues and finances these projects through taxes paid by individuals and firms. Friedman (1970) states that spending the firm's money on social issues reduces first the revenue of the firm and second the tax paid to the government. Due to that fact that a manager is "an expert in running his company - in producing a product or selling it or financing it" (p. 2) and not in financing social projects, Friedman (1970) supposes an inefficient use of the firm's money. He further points out that the manager is an agent of the firm, who is only in "direct responsibility to his employers. That responsibility is to conduct the business in accordance with their desires, which generally will be to make as much money as possible while conforming to the basic rules of the society, both those embodied in law and those embodied in ethical costume"(p. 1).

However, Friedman (1970) softens his critique by the argument that managers have to run businesses according to the owners' desire "while conforming to the basic rules of the society, both those embodied in law and those embodied in ethical costume"(p. 1). It is the confirmation of the basic rules of society which legitimates CSR. Ringger (2002), CEO of SAM Sustainability Asset Management, also states that in the end those who are marred by an insufficient corporate governance (or CSR) are the shareholders and therefore it would be in the shareholders' interest to opt for a working corporate governance. This qualifies the Friedman's argument against the CSR implantation into the firm's management. Maximizing profits disregarding the firm's environment cannot be the long-term objective of a firm because it neglects the influence of stakeholders on the firm's survival. Additionally, in a real world situation firms almost face imperfect and complex market conditions. External effects and asymmetric information lead to market failure and sub-optimal profits.

According to Pindyck and Rubinfeld (1998), asymmetric information is defined as one party (e.g. the agent) having more information than the other party (e.g. the principal). This is also known as the principal-agent-problem. The principal-agent-problem could appear for instance between firm and employee, entrepreneur and manager, salesman and customer, doctor and patient, or bank and beneficiary. Asymmetric information could lead to an adverse selection and to inefficient market outcomes.

In the case of asymmetric information where firms know more about their real behavior than their stakeholders, CSR could function as signal for firms and to distinguish itself from its competitors. Depending on the issue for which the signal is sent for, the firm can use CSR to signal low risk, good working conditions, reliability, responsibility or profitability, just to mention some of the possible issues. According to Akerlof (1970) that especially in markets with dishonesty sending signals increases the profits of the senders. Sending a reliable signal is also important due to the possibility of the firms' deviation from their CSR management issue after the announcement. Further, the firms' signals can be assessed by the uninformed party through screenings like ratings and rankings. From RBV of the firm formulated by McWilliams et al. (2006), CSR would then be an institutional signal for their noneconomic issues.

Fombrun and Shanley (1990) state that from a manager's view, CSR should create goodwill "from employees, consumers, and other publics that enhances the long-run profitability"(p. 239) as well as the survival of firms (and the own employment). Their research on this field supports the thesis of the importance of demonstrating social behavior for gaining reputation. Also Graves and Waddock (1994, 1997), Turban and Greening (1997), and Roberts and Downling (2000) find a positive correlation between reputation (or corporate social performance) and profits. Orlitzky et al. (2003)

find only little support in their meta-analysis. They argue that this low impact of reputation may be explained by study artifacts like errors in sampling and measuring.

Building up a good reputation or a standardized image can also be interpreted as a vertical product differentiation. McWilliams et al. (2006) contrast the horizontal differentiation, where “the preference is based on taste, rather than quality”(p. 5), to vertical differentiation which can be directly linked with the reputation of a firm or quality of a product. They believe that the image of a product will be enhanced by the image of the firm and therefore adds some sort of new feature to the product. The vertical product differentiation allows the consumer to rank a bulk of identical products due to their additional attributes which could be for example the CSR image of the producing firm. This additional attributes does not mean that the product will work better than others, but vertical differentiation through CSR makes a good (or firm) less substitutable. The only requirement on this attribute is to be valuable for the customer which will allows the firms to charge higher prices, to enlarge their market share or to simply stay into business.

Additionally, according to Fombrun and Shanley (1990), the risk of firms may decline because of higher product-market related diversification. They state that firms with a diversified product range are less dependent on the development of one segment. Diversified firms can compensate losses in one product market by profits in another which reduces the overall risk of these firms. McWilliams and Siegel (2001) describe product-market related diversification as often accompanied by investments in research and development, like adding new features or to implement the use of special (for example ecological or fair trade) resources (product innovation) or producing “in a socially responsible manner (process innovation)”(p. 119).

Summarizing, firms can send signals of quality and diversification to gain sustainable advantages or simply to stay in business. Through CSR firms are able to send unique signals and therefore create a non-substitutable attribute of its brand, product or image and allow firms to gain higher profits. Fombrun and Shanley (1990), Graves and Waddock (1994, 1997), Turban and Greening (1997), Pindyck and Rubinfeld (1998), Roberts and Downling (2000), Orlitzky et al. (2003), and McWilliams et al. (2006) argue that the reputation of a firm has an impact on the firm’s profit. According to the resource-based-view-of-the-firm, CSR can be regarded as reputation building resource which leads to the hypothesis that firms engaging in CSR increase their profits. This hypothesis will be examined in the following empirical part of the paper through estimating the average treatment effect on the treated (ATT) after a propensity score estimation.

3 Data

To empirically investigate this hypothesis we turn to the Dow Jones Sustainability Index (DJSI). The SAM Group (2007) published the Dow Jones Sustainability Index first in 1999 and updates this index every September. The DJSI aims to provide an index of the best sustainable firms in the world and contains the top 10% firms of the 2,500 best performing firms of the Dow Jones Global Index (DJGI). Its hierarchical structure to the DJGI is show in Figure 1. The DJSI is a best-in-best index and also provides sub-indexes, e.g., the European and North American set of indexes and their subset indexes for pan-European, the Eurozone, blue chip indexes, and the United States. The DJGI as well as the European and the North American Indexes also comprise narrower subsets which exclude firms involved in alcohol, tobacco, gambling, and/or armaments & firearms. The SAM Group invites all firms of the Dow Jones Global Index based on their market capitalization which is a measure of the company’s equity value at the end of the preceding December to the assessment. Firms that pass this assessment are then included in the index, in 1999 these were 209 of the 2500 in the DJGI.

To find the best firms in their sectors, SAM Group uses the 18 supersectors provided by *Industrial Classification Benchmark* to generate their own 57 DJSI sectors. According to this classification, the best firms of each sector are assessed following a complex evaluation model which includes economic, environmental and social criteria. The firms chosen for the DJSI are continuously reviewed and may be delisted if needed.

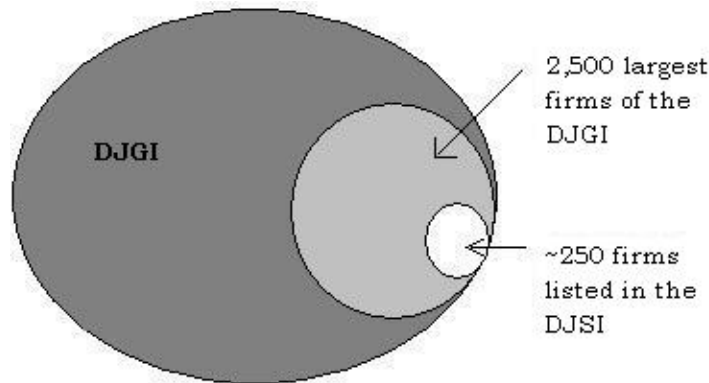


Figure 1: Integration of DJSI in the DJ. Source: Own illustration.

The sources of information are:

- company questionnaires,
- company documentation like environmental reports, annual financial reports,
- media and stakeholders like review media, press releases, and articles,
- and direct contact with the company over the past twelve months.

Based on this information, an individual sustainability performance score is calculated and weighted according to general criteria such as corporate governance, environmental management and performance, human rights and so forth, and according to industry specific criteria. These are reviewed quarterly and the scores are used to identify the leading firms of each sector in terms of sustainability. To guarantee the quality of the assessment, the SAM Group’s assessment for corporate sustainability has been verified by PricewaterhouseCoopers.¹ The reliability and quality of the CSR measure is most important to identify a causal relationship between CSR and the firms’ performance. Therefore, e.g. Moskowitz’s rating or the rating of businessmen and business students are not likely to be the best CSR proxies. Changes in market performance, for example, the market value, are driven by new information. Ratings done by businessmen and business students use market information and subjective valuation as rating criteria. Therefore, those ratings will not yield any significant new information (except the subjective valuation) for the market and a no-reaction of the firms’ market value can be assumed beforehand.

We identify 298 firms in the DJSI in 1999 and 2000. For comparison reasons, we select a random sample of 253 firms from the remaining firms on the invitation list of the DJGI. The fact that the DJSI represents a best-in-best index ensures that the firms of the DJSI and the firms of the control group are fairly similar despite of their CSR management. One could argue that the inclusion in the DJSI according to different management objectives would only include those firms which are nevertheless better than the not included once which leads to an upward bias of the instruments ef-

¹ For further information also see the Dow Jones Sustainability Index Handbook published by SAM Group (2007).

fect. This would be true if the firms in the DJSI are selected because of their better profitability. By using criteria, e.g., like the corporate governance structure, the risk & crisis management, the environmental performance, the human capital development and social reporting (just to mention a few), the inclusion into the DJSI is not depending on the profitability itself. So the “best-in-best” has to be interpreted as the best corporate sustainable practice out of the most profitable firms of the DJ. If firms of the DJSI perform economically better than those which are not included, this than should be caused by the difference in their CSR.

We use the inclusion in the Dow Jones Sustainability Index as our proxy for CSR of firms. The firm specific data of the DJSI and the DJGI firms are collected from 1997 to 2008 from the Thomson “datastream” data base. In order to produce results comparable to earlier studies, the ROIC, the ROE, and the EBIT are used as profit measures. Additionally, we obtain the net margin, the cost of sold goods, and the debt of a firm as independent variables. The net margin is calculated as ratio of net profits to net revenues and describes the efficiency of generating profits from revenues. It allows the comparison of different firms of the same or different industry sector. This is an improvement compared to the ROI profit measure because it is independent of the capital structure and investment volumes which are likely to differ across firms (especially if they are from different industry sectors).

The total debt of a firm is used to describe its risk to its stakeholders. The higher the firm’s total debts the riskier is the firm. High debts suppose possible difficulties of meeting future demands and demonstrate a risk. The use of market based measures, e.g. the market value of a firm, to investigate the causal relation between profitability and the inclusion into the DJSI as CSR measure is addressed to further research.

Further, total sales and total assets are used as measures for size. According to the economies of scales described by Milgrom and Roberts (1992), large firms acquire cost advantages due to the large amount of production quantities which reduce the costs per unit and increase the firms’ profits. The size of firms could also matter in combination with engaging in CSR or not. Small firms could use CSR to position themselves in a niche market with few or no competitors which allows them to increase their profits. This specialization with the CSR issue is therefore positively related with small firms’ profits.

Different to Waddock and Graves (1997) the number of employees is used as approximation for the firms’ capital intensity as it is employed employees over total capital. Firms with a greater capital intensity ratio are therefore more labor intensive than those with a lower ratio. Due to different cost structures it can be assumed that raising capital for implementing CSR is easier for capital intensive firms than for labor intensive ones. This could be put similar to the virtuous circle described by Nelling and Webb (2006) who assumed bidirectional causality between CSR and profits.

R&D expenditures are often neglected in models of the firms’ performance. According to McWilliams and Siegel (2000) investment in R&D generates innovations in production and process management further leading to higher productivity and therefore profit levels. They argue that ignoring this effect would lead to an upward biased of the CSR measure (McWilliams and Siegel 2000). Therefore, we included the expenditures for R&D as additional control variable.

Sector indicator variables are constructed according to the Industry Classification Benchmark (ICB) of the FTSE Group (2008) and the Dow Jones Indexes (10 economic sectors). The analyses include also six regional dummy variables (North America, South America, Europe, Africa, Asia

and Australia), dummies for each year to allow for nonlinear time trends as well as a dummy variable for the OECD membership of firm's home country.

The summary statistics of the variables used are given in Appendix 2. Table 1 shows the mean values, the standard deviation and the number of observations for the time before the implementation of the DJSI and further distinguishes between firms which are never going to be included into the DJSI and firms which will be included in 1999 or 2000. Table 2 then compares the variables of interest, again for DJSI and DJGI firms separately, from 1999 onwards. From these tables it is obvious to see that the firms from the DJSI and DJGI are much alike. This is very important for our analysis because it is impossible to investigate a firm which is not listed in the DJSI and listed at the same time we need a control group of firms not listed in the DJSI which is similar to the DJSI firms despite of their Index inclusion. Then we can compare these firms like siblings and find the pure effect of the DJSI inclusion.

4 Econometric Approach

To analyze the effect of inclusion in the index, i.e., the effect of more CSR, on firms' profits, we employ propensity score matching to estimate the average effect of treatment on the treated (ATT).² (.) The ATT is the difference of outcomes for firms with, Y_1 , and firms with no treatment, Y_0 :

$$ATT = E[Y_1|D=1] - E[Y_0|D=1] \quad (2)$$

However, we do not estimate the difference between the DJGI firms and the DJSI firms which would refer to an average treatment effect (ATE). In our study we are explicitly interested in the effect of the Index inclusion for firms potent for being listed into the DJSI which is the average treatment effect on the treated (ATT). According to Rosenbaum and Rubin (1983) estimating the ATT requires the assumptions of the "unconfoundedness" of the control group and of the weak overlap. The assumption of "unconfoundedness" states that the non-treated group's outcome should be independent from the treatment.

This requirement is assumed to hold due to the fact that a CSR treatment increases the firm's image or at least not decrease it in the case of no treatment. The profits of non-treatment firms are therefore assumed to be unaffected by the treatment decision. The weak overlap assumption relaxes the strict assumption of the positive probability of being in the treatment or non-treatment group to a requirement of a probability less than 1. Therefore it must be possible to find pairs of siblings in terms of their propensity score which only differ in the treatment assignment.

By estimating the ATT, a logit model will be estimated first to obtain the propensity scores of the treatment group being treated and the non-treated group being not treated.³ The propensity score is defined as probability for a firm being listed in the DJSI or not. As mentioned before, the idea of the ATT is that the comparison of firms which yield the same probability being listed in the DJSI or not (from the logit estimation) gives the difference in their outcomes depending on the DJSI inclusion. To estimate the propensity scores we used the following equation model:

$$P[DJSI_i=1|X] = G(\alpha_0 + \beta_1 X_{i97} + \beta_2 X_{i98} + \beta_i X_i) \quad (3)$$

Equation (3) shows that the logit estimation uses the time variant components (X_{i97} and X_{i98}) before the treatment in 1999 plus all time invariant variables X_i . This refers to the need of independence

² See Blundell and Dias (2008) for an overview.

³ Caliendo and Kopeining (2005) believe that for the binary choice model the decision for probit or logit is not critical because of their similar results.

of the right-hand-side variables and with the DJSI inclusion in 1999 only variables before the treatment and variables controlling for individual fixed effects are used to estimate the propensity scores.

According to Caliendo and Kopeining (2005), the ATT can be estimated by different matching algorithm of the propensity scores. Although the approaches differ in their output's quality and bias due to poor matchings, Smith (2000; in Caliendo and Kopeining 2005) notes that the differences in estimation outcomes should asymptotically decline with the sample size. Caliendo and Kopeining (2005) as well as Becker and Ichino (2002) recommend to estimate different approaches for robustness checks (see Appendix 1 for details of the implemented matching methods).

The model for the different matching methods employed to estimate the ATT looks as follows:

$$ATT = E[(Profit_t - Profit_{(t-1)})|DJSI=1, P(X)] \quad (4)$$

considering the propensity score $P(X)=Pr(DJSI=1|X)$ of being listed in the DJSI given the pre-treatment variables in vector X . Estimating first the propensity of being listed in the DJGI or in the DJSI and comparing the profits of firms with the same propensity scores of being in their group in a second steps gives the average treatment effect. This is an useful tool when the underlying mechanism of selection is not known or not randomly distributed.

5 Results from Average Treatment Effect on the Treated (ATT)

Table 7 in Appendix 2 presents the estimated ATT of the DJSI inclusion on the average of the profits from 1999, 2000 and 2006. The ATT is positive effects for the DSJI inclusion in 60 out of 84 different matchings. Although the NNM, the kernel matching, the local linear regression matching yield negative ATT on the logarithm of ROIC in any variation, the radius matching find positive and significant ATT. The ATT is very different from one matching method to another but relatively consistent within an estimation method.

The ATT with the radius matching method provides most of the significant positive results which range from 0.237 for the net margin model to 0.471 for the EBIT model with caliper of 0.1. This indicates that for firms in the DJSI the ATT of being listed in the DJSI on the logarithm of ROIC is in average from 0.237 to 0.471 higher after the listing than before.

Table 5 and Table 6 in Appendix 2 represent an example of these differences for the ROIC in 1999 and in 2006 between the DJSI firms (treated) and the DJGI firms (untreated) which is significantly different at a 5% level. They show the mean effect of being listed in the DJSI or not for the matched and unmatched firms as well as the differences between the treated firms and the control group with standard errors and t statistics. Interestingly, the difference between the treated and control group is negative for the log ROIC in 2006 for both matching specifications. This difference even grows if the matching becomes more stringent. This few is also supported by Table 7 where the more stringent matching outcomes show lower and often small negative ATTs than matching with standard specifications.

An unbalanced distribution of the propensity scores after a logit estimation with ROIC is presented in Figure 2 and Figure 3. The densities of the propensity scores of the DJSI and DJGI firms are not equally skewed. The DJSI firms have higher densities of high propensities whereas the DJGI more of low propensity levels. Additionally some gaps and extreme low densities could explain the few significant results. As the Table 6 shows a trimming of 6% of the observed propensities eliminates four of the 68 treated which are lower than 6%. The 64 remaining are used together with 63 firms from the control group for the ATT estimation. This method is recommended by Smith and Todd

(2005; in Caliendo and Kopeining 2005) especially in the case of asymmetric densities and is additionally tested for every matching method.

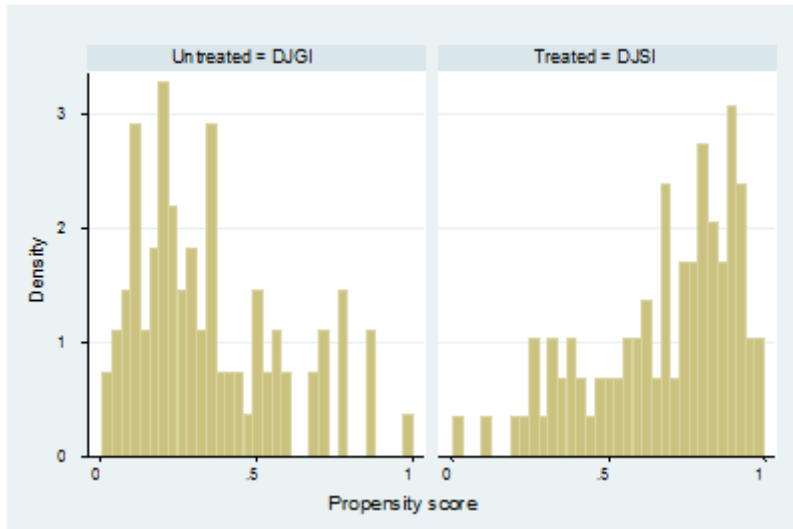


Figure 2: Density of propensity scores of DJSI and DJGI firms after logit with ROIC.

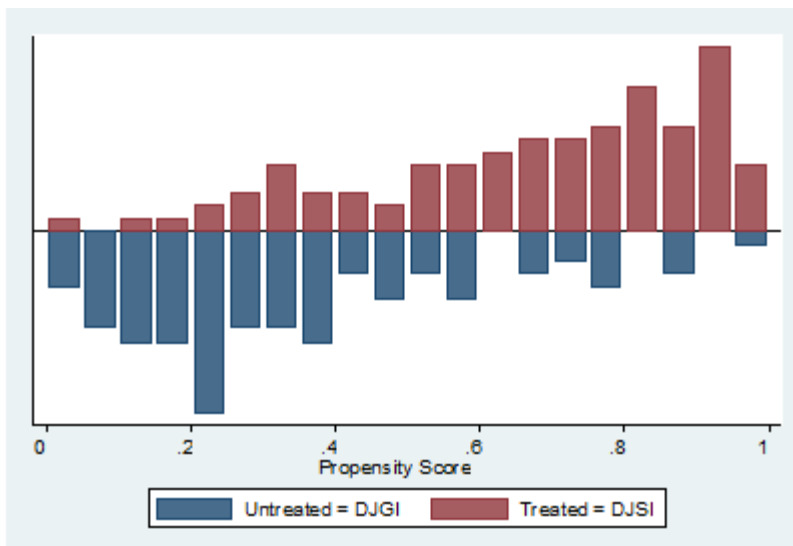


Figure 3: Propensity scores distribution of DJSI and DJGI firms after logit with ROIC.

An asymmetric structure of the propensity scores could also be detected in for the ROE, EBIT and net margin (see Figures 4 to 9 in Appendix 2). This is especially the case for the EBIT profit variable which could probably be the reason for the extreme high values of ATT for all the different matching methods.

The poor support (number of firms used for matching) of the other matching methods could be referred to eventually too stringent specifications of the common support, trimming or matching partners. This is one of the drawbacks described earlier. Efficient matching outcomes are not similarly attainable with unbiasedness.

Despite the above mentioned explanations for the sometimes poor outcomes of this study, the problem could be referred to the length of the analyzed time span. As with the R&D expenditures which produce profits in the long run and cost in the short run, the period of this study could be too short especially for the time before the DJSI inclusion to catch the positive effects of the CSR behavior of the firms. The request of expanding the time period, of advanced estimation methods and of the identification of better predictors with more firm specific data is forwarded to further studies.

Nevertheless, the few significant coefficients draw a picture of positive relations between CSR and profits. This indicates that the proof of the positive relation is weak but not rejectable. Therefore, CSR does not significantly reduce the profitability of a firm.

6 Conclusion

Because of some contrary results and the preferred usage of OLS regression methods in previous studies with accounting based profit variables, an additional study with the inclusion in the DJSI index as CSR measure has been undertaken. The aim of the research was to find an answer to the question: What is the average treatment effect of the CSR treatment "being listed in the DJSI" for the firms which got the treatment?

The estimated ATTs show significant positive effects of CSR behavior of a firm which is represented by an inclusion into the DJSI. This again supports the resource-based-view-of-a-firm that CSR has a positive effect on the firms' profits. The conclusion of this research paper is that a positive connection between CSR and the firm's profit could not be neglected. This indicates that firms investing in CSR are not penalized through significant lower profits. In fact, firms in competitive markets could use this management tool to gain more profits through diversification. Further, the implementation of CSR requires the detection of future trends and developments which makes the firms more stable to sudden events. Shareholders as well as stakeholders who are interested in long term relations with a firm should therefore prefer CSR behaving firms to address their interest.

References:

- Akerlof, George A. (1970) *The Market for Lemons: Quality Uncertainty and the Market Mechanism*, Quarterly Journal of Economics **84**(3).
- Alexander, G.J./Buchholz, R.A. (1978) *Research notes. Corporate Social Responsibility and Stock Market Performance*, Academy of Management Journal **21**(3), 986-1014.
- Augurzky, B./Schmidt, C.M. (2001) *The Propensity Score: A Means to an End*, Discussion Paper Series IZA DP No. 271, Institute for the Study of Labor, March.
- Balabanis, G./Phillips, H:C./Lyll, J. (1998) *Corporate Social Responsibility and Economic Performance in the top British Companies: Are They Linked?*, European Business Review **98**(1), 25-44.
- Baser, O. (2007) *Propensity Score Matching with Linear Overlap*, Economics Bulletin **9**(8), 1-8.
- Becker, S.O./Ichino, A. (2002) *Estimation of Average Treatment Effects based on Propensity Scores*, The Stata Journal **2**(4), 358-377.

- Blundell, R./Dias M.C. (2008) *Alternative Approaches to Evaluate in Empirical Microeconomics*, Discussion Paper Series IZA DP No. 3800, Institute of the Study of Labor, October.
- Caliendo, M./Kopeinig, S. (2005) *Some Practical Guidance for the Implementation of Propensity Score Matching*, Discussion Paper Series IZA DP No. 1588, Institute for the Study of Labor, May.
- Carroll, A.B. (2004) *Managing Ethically with Global Stakeholders: A Present and Future Challenge*, *Academy of Management Executive* **18**(2), 114-120.
- Chen, H.-L./Metcalf, R.W. (2006) *The Relationship between Pollution Control Record and Financial Indicators Revisited*, *The Accounting Review* **55**(1), 168-177.
- Cochran, P.L./Wood, R.A. (1984) *Corporate Social Responsibility and Financial Performance*, *Academy of Management Journal* **27**(1), 42-56.
- Domini Social Investment (2007) *About KLD, Global Investment Standards, Stock Funds Standards, and Shareholder Activism*, Link: <http://www.kld.com/indexes/index.html> (Downloaded: November 16, 2007).
- Folger, H.R./Nutt, F. (1975) *A Note on Social Responsibility and Stock Valuation*, *Academy of Management Journal* **18**(1), 155-160.
- Fombrun, C./Shanley, M. (1990) *What's in a Name? Reputation Building and Corporate Strategy*, *Academy of Management Journal* **33**(2), 233-258.
- Freeman, R.E. (1984) *Strategic Management: A Stakeholder Approach*, Boston, Pitman Publishing.
- Friedman, M. (1970) *The Social Responsibility of Business is to increase its Profits*, *The New York Times Magazine*, September 13, Link: <http://www.colorado.edu/studentgroups/libertarians/issues/friedman-soc-resp-business.html> (Downloaded: March 20, 2008).
- FTSE the Index Company (2008) *Industry Classification Benchmark*. Link: http://www.ftse.com/Indices/Industry_Classification_Benchmark/index.jsp (Downloaded: September 8, 2008).
- Graves, S.B./Waddock, S.A. (1994) *Institutional Owners and Corporate Social Performance*, *Academy of Management Journal* **37**(4), 1034-1046.
- Grewe, W./Löffler, J. (2006) *Apsekte der CSR aus Wirtschaftsprüfersicht*, in Gazdar, K./Habisch, A./Kirchhoff, K.R. (eds.), *Erfolgsfaktor Verantwortung: Corporate Social Responsibility professionell managen*, Berlin, Springer Verlag, pp. 3-11.
- Imbens, G.W./Angrist, J.D. (1994) *Identification and Estimation of Local Average Treatment Effects*, *Econometrica* **62**(2), 467-475.
- Ingram, R.W. (1978) *An Investigation of the Information Content of (Certain) Social Responsibility Disclosures*, *Journal of Accounting Research* **16**(2), 270-285.
- Mahapatra, S. (1984) *Investor Reaction to a Corporate Social Accounting*, *Journal of Business Finance & Accounting* **11**(1), 29-40.
- McGuire, J.B./Sundgren, A./Schneeweis, T. (1988) *Corporate Social Responsibility and Firm Financial Performance*, *Academy of Management Journal* **31**(4), 854-872.
- McWilliams, A./Siegel, D.S./Wright, P.M. (2006) *Corporate Social Responsibility: Strategic implications*, *Journal of Management Studies* **43**(1), 1-18.

- McWilliams, A./Siegel, D. (2000) *Research Notes and Communications. Corporate Social Responsibility and Financial Performance: Correlation or Misspecification?*, Strategic Management Journal **21**, 603-609.
- McWilliams, A./Siegel, D. (2001) *Corporate Social Responsibility: A Theory of the Firm Perspective*, Academy of Management Review **26**(1), 117-127.
- Milgrom, P./Roberts, J. (1992) *Economics, Organizations and Management*, International ed., Prentice Hall International.
- Moskowitz, M. (1972) *Choosing Social Responsible Stocks*, Business and Society Review **1**, 71-75.
- Nelling, E./Webb, E. (2006) *Corporate Social Responsibility and Financial Performance: The "Virtuous Circle" Revisited*, Draft: August 2006, Link: http://www.fma.org/SLC/Papers/CSR_and_Financial_Performance_FMA.pdf (Downloaded: May 20, 2008).
- Orlitzky, M./Schmidt, F.L./Rynes, S.L. (2003) *Corporate Social and Financial Performance: A Meta-Analysis*, Organization Studies **24**(3), 403-441.
- Petersen, T. (2003) *A Propensity Score Matching Method for the Link between Accessibility and Productivity*, Paper for the 43rd European Congress of the Regional Science Association in Jyväskylä, August 27-30, 2003, Link: <http://www.ersa.org/ersaconfs/ersa03/cdrom/papers/18.pdf> (Downloaded: April 16, 2008).
- Pindyck, R.S./Rubinfeld, D.L. (1998) *Mikroökonomie*, 4 ed., Oldenbourg, Oldenbourg Verlag.
- Promberger, K./Spiess, H. (2006) *Der Einfluss von Corporate Social (and Ecological) Responsibility auf den Unternehmenserfolg*, Working Paper No. 26, University of Innsbruck.
- Ringger, R. (2002) *Vorwort in SAM Insight Newsletter zum Thema Corporate Governance*, SAM Insight Newsletter **1**, 2.
- Roberts, P./Dowling, G.R. (2002) *Reputation and Sustained Superior Financial Performance*, Strategic Management Journal **23**(1), 1077-1093.
- Rosenbaum, P.R./Rubin, D.B. (1983) *The Central Role of the Propensity Score in Observational Studies for Causal Effects*, Biometrika **70**, 41-55.
- SAM Group (2007) *Dow Jones Sustainability World Index Guide*, 9.0 ed., SAM Group, Link: [http://www.sustainability-indexes.com/djsi_pdf/publications/Guidebooks/DJSI_World_Guidebook_90\[1\].pdf](http://www.sustainability-indexes.com/djsi_pdf/publications/Guidebooks/DJSI_World_Guidebook_90[1].pdf) (Downloaded: November 16, 2007).
- Shane, P.B./Spicer, B.H. (1983) *Market Response to Environmental Information Produced Outside the Firm*, The Accounting Review **58**(3), 521-538.
- Spicer, B.H. (1978) *Investors, Corporate Social Performance and Information Disclosure: An empirical Study*, The Accounting Review **53**(1), 94-111.
- The Economist (2008) *Just Good Business: A Special Report on Corporate Social Responsibility*, The Economist **386**, January 19th, 2008.
- Turban, D.B./Greening, D.W. (1997) *Corporate Social Performance and Organizational Attractiveness to Prospective Employees*, Academy of Management Journal **40**(3), 658-672.
- Vance, S.C. (1975) *Are Socially Responsible Corporations Good Investment risks?*, Management Review **64**(8), 18-24.

Varian, H.R. (1984) *Microeconomic Analysis*, 2 ed., New York, Norton.

Waddock, S.A./Graves, S.B. (1997) *The Corporate Social Performance – Financial Performance Link*, *Strategic Management Journal* **18**(4), 303-319.

Waldman, D.A./Siegel, D.S./Javidan, M. (2006) *Components of CEO Transformational Leadership and Corporate Social Responsibility*, *Journal of Management Studies* **43**(8), 1703-1725.

Zu, L./Song, L. (2008) *Determinantes of Managerial Values on Corporate Social Responsibility: Evidence from China*, Discussion Paper Series IZA DP No. 3449, Institute for the Study of Labor, April.

APPENDIX 1

Details to the employed different matching methods for the ATT

We use the following common matching methods:

- Nearest neighbor matching (NNM hereafter) with replacement: This algorithm is the most intuitive because it matches pairs of individuals - one from the treatment and one from the non-treatment group - which are closest in their propensity scores. NNM allows matchings with replacement which increase the matching quality because of the multiple use of one neighbor. Caliendo and Kopeining (2005) point out that especially when the distributions of the propensity scores strongly differ for the treatment and the non-treatment group, the replacement method prevents matchings of for example high-score treated with low-score non-treated if there are more high-score treated than low-score non-treated individuals. It uses the same individual to match all of its nearest neighbors. Additionally, matching with replacement overcomes the problem of the matching order which could lead to biased results if the matching is not done randomly. A drawback of the NNM is the possibility of bad matches if the nearest neighbor is far away especially with replacements of matched neighbors. In this case the same nearest neighbor would be used too often and creates biased results. Oversampling by using more than one nearest neighbor also decreases the variance but could be biased due to poorer matches in the average. The NNM of the subsequent analyses matches with an one-to-one and an one-to-four specification, both with replacement.
- Caliper and radius matching: The caliper matching introduces a maximum distance between the propensity scores used for the matching. The nearest neighbor within this propensity distance (caliper) is then chosen for matching. Smith and Todd (2005; in Caliendo and Kopeining 2005) find the difficulty to define a caliper a priori as possible disadvantage of this method. The radius matching uses all possible neighbors within the range of the caliper and defines therefore a radius of possible propensity matches. Although this matching method increases its matching quality it does not suffer from poorer matches like the oversampling of the NNM. Referring to the default option of the matching procedure implemented by Becker and Ichino (2002) of 0.1, two lower radius levels of 0.08 and 0.05 are also used in the subsequent analyses.
- Kernel and local linear matching: The kernel and the local linear matching methods provide non-parametric matchings. Different to the above mentioned matching methods, the kernel and the local linear matching methods use the weighted average of almost all individuals of the control group to compute the counterfactual outcome of a treated individual. But the advantage of lower variance is again accompanied by the possibility of poor matches. According to Smith and Todd (2005; in Caliendo and Kopeining 2005) the kernel matching can be interpreted “as a weighted regression of the counterfactual outcome on an intercept.”(p. 11). The weights are determined by the distance between the each matching pair and the intercept can be interpreted as the estimate of the counterfactual mean. A linear term of the propensity score of an treated individual is added to the intercept in the local linear matching approach which allows to compare treated and non-treated with asymmetric propensity score distributions or even with gaps. The problem of the kernel and the local linear matching approaches is caused by the decision of the bandwidth parameter for estimating the density function. Smoother density functions through higher bandwidths have the advantage of decreasing the variance of the estimated and the true density function but may also cancel out some of its underlying characteristics which again leads to biased estimates. The default of 0.06 provided by *Stata* is used for the bandwidth parameter. The support of this bandwidth selection will be shown when discussing the estimation outcomes.

Differences in the density of the propensity scores requires additional restrictions of the common support or a trimming method to improve the estimates quality. Becker and Ichino (2002) state that a common support restriction using minimum and/or maximum values for the propensity scores necessarily yields no better results than without the restrictions. They accredit this to the loss of some observations. Contrary to them, Caliendo and Kopeining (2005) argue that the use of common support conditions depends on the matching method. They find this more important for the kernel matching which uses nearly all individuals of the control group than for example for the NNM which only matches the treated individual to its nearest neighbor of the control group. In their opinion the NNM is especially with caliper restrictions robust against the common support problem. Smith and Todd (2005; in Caliendo and Kopeining 2005) introduce a different approach to the problem of asymmetric density of the propensity scores. They use a trimming procedure excluding every interval of the common support region which yields zero or extremely low densities.

We use all of the above mentioned methods (except those of the caliper which is replaced by the radius matching) are implemented for robustness checks. To decide on the choice between the common support and the trimming a detailed examination of the data and of the density distributions of the propensity scores will be described in a later section. The method of propensity score matching is well established in empirical work and supported by papers of Imbens and Angrist (1994), Augurzky and Schmidt (2001), Becker and Ichino (2002), Petersen (2003), Caliendo and Kopeining (2005), and Baser (2007), amongst others.

APPENDIX 2

Table 1: Descriptive statistics of the main variables before 1999.

	Descriptive statistics of the main variables separated by being listed in the DJSI or in the control group of the DJGI before 1999.					
	Before 1999					
	DJSI firms			DJGI firms		
	Mean	Std. dev.	Obs.	Mean	Std. dev.	Obs.
Log ROE	2.532	0.941	563	2.446	0.976	589
Log ROIC	2.020	1.033	585	2.049	0.901	606
Log EBIT	6.261	1.649	574	5.687	1.477	597
Log net margin	1.708	1.053	578	1.739	1.201	598
Log R&D	4.505	2.379	303	4.340	1.655	260
Log sales	8.321	1.732	604	7.663	1.709	645
Log total assets	8.904	2.077	613	8.291	1.713	650
Log capital intensity ratio	1.554	1.742	573	1.463	1.554	604
Log total debt	7.377	2.274	606	6.660	2.159	635
Log cost of goods	7.614	1.865	510	7.148	1.890	525
OECD membership	0.939	0.239	657	0.900	0.300	700
Economic sectors:						
1 Basic resources	0.081	0.274	651	0.102	0.303	668
2 Cyclical goods	0.089	0.285	651	0.117	0.321	668
3 Energy	0.025	0.155	651	0.027	0.162	668
4 Financials	0.118	0.323	651	0.219	0.414	668
5 Health care	0.034	0.181	651	0.039	0.194	668
6 Industrials	0.166	0.372	651	0.189	0.392	668
7 Non cyclical goods	0.041	0.200	651	0.084	0.277	668
8 Technology	0.049	0.216	651	0.117	0.321	668
9 Utility	0.057	0.232	651	0.054	0.226	668
10 Others	0.339	0.474	651	0.054	0.226	668
Regions:						
North america	0.298	0.458	657	0.411	0.492	700
South america	0.009	0.095	657	0.026	0.158	700
Europe	0.461	0.499	657	0.269	0.444	700
Asia	0.175	0.380	657	0.246	0.431	700
Africa	0.012	0.110	657	0.026	0.158	700
Australia	0.044	0.206	657	0.023	0.150	700

Table 2: Descriptive statistics of the main variables from 1999 onwards.

Descriptive statistics of the main variables separated by being listed in the DJSI or in the control group of the DJGI from 1999 onwards.

	From 1999 onwards					
	DJSI firms			DJGI firms		
	Mean	Std. dev.	Obs.	Mean	Std. dev.	Obs.
Log ROE	2.586	0.928	1,903	2.471	0.954	2,324
Log ROIC	1.964	1.004	1,983	1.965	0.934	2,430
Log EBIT	6.638	1.740	1,994	6.144	1.617	2,405
Log net margin	1.799	1.025	1,938	1.834	1.181	2,359
Log R&D	4.885	2.233	1,180	4.615	1.954	1,195
Log sales	8.763	1.632	2,140	8.214	1.717	2,651
Log total assets	9.359	1.979	2,128	8.853	1.795	2,688
Log capital intensity ratio	1.328	1.519	2,035	1.230	1.589	2,504
Log total debt	7.865	2.290	2,163	7.229	2.221	2,611
Log cost of goods	8.041	1.723	1,859	7.641	1.867	2,263
OECD membership	0.946	0.227	2,799	0.900	0.300	3,500
Economic sectors:						
1 Basic resources	0.085	0.278	2,781	0.102	0.302	3,340
2 Cyclical goods	0.091	0.288	2,781	0.117	0.321	3,340
3 Energy	0.024	0.154	2,781	0.027	0.162	3,340
4 Financials	0.119	0.324	2,781	0.219	0.413	3,340
5 Health care	0.031	0.173	2,781	0.039	0.193	3,340
6 Industrials	0.147	0.354	2,781	0.189	0.391	3,340
7 Non cyclical goods	0.042	0.201	2,781	0.084	0.277	3,340
8 Technology	0.049	0.216	2,781	0.117	0.321	3,340
9 Utility	0.056	0.229	2,781	0.054	0.226	3,340
10 Others	0.356	0.479	2,781	0.054	0.226	3,340
Regions:						
North america	0.294	0.456	2,799	0.411	0.492	3,500
South america	0.006	0.080	2,799	0.026	0.158	3,500
Europe	0.471	0.499	2,799	0.269	0.443	3,500
Asia	0.178	0.382	2,799	0.246	0.431	3,500
Africa	0.014	0.119	2,799	0.026	0.158	3,500
Australia	0.037	0.188	2,799	0.023	0.149	3,500

Table 3: Pair wise correlations of main variables.

	Log ROE	Log ROIC	Log EBIT	Log R&D	Log sales	Log total assets	Log capital intensity	Log total debt	Log net margin	Log net cost of goods
Log ROE	1.000									
Log ROIC	0.7818***	1.000								
Log EBIT	0.2516***	0.1225***	1.000							
Log R&D	0.007	-0.002	0.6301***	1.000						
Log sales	0.0429***	-0.0849***	0.8357***	0.6634***	1.000					
Log total assets	-0.009	-0.2553***	0.8694***	0.6641***	0.8467***	1.000				
Log capital intensity	0.1764***	0.2786***	-0.3963***	-0.2284***	-0.2185***	-0.5113***	1.000			
Log total debt	-0.0384***	-0.3445***	0.7364***	0.4641***	0.7341***	0.8634***	-0.4685***	1.000		
Log net margin	0.6323***	0.5589***	0.1414***	-0.012	-0.2926***	-0.0438***	-0.2313***	-0.105***	1.000	
Log cost of goods	-0.003	-0.090***	0.7475***	0.5536***	0.968***	0.8474***	-0.1219***	0.7138***	-0.3914***	1.000

Note: *** p<0.01, ** p<0.05, * p<0.10.

Table 4: Logit estimation before propensity score estimation for ROIC, ROE, EBIT and net margin.

Logit estimation before propensity score estimation for ROIC, ROE, EBIT and net margin.				
Dependent variable	Log ROIC	Log ROE	Log EBIT	Log net margin
Dep. var. in 1997	0.359 (0.440)	0.537* (0.312)	2.055*** (0.644)	0.447 (0.307)
Dep. var. in 1998	0.606 (0.472)	0.184 (0.267)	-0.878 (0.540)	0.145 (0.294)
Log R&D in 1997	-0.461 (0.990)	-0.355 (0.989)	0.470 (1.055)	-0.242 (0.995)
Log R&D in 1998	0.649 (0.972)	0.506 (0.956)	-0.291 (1.023)	0.390 (0.968)
Log sales in 1997	3.739 (2.571)	3.378 (2.581)	0.356 (2.631)	3.694 (2.472)
Log sales in 1998	-3.183 (2.576)	-2.028 (2.672)	1.030 (2.693)	-1.674 (2.578)
Log total assets in 1997	-1.463 (2.047)	-0.573 (2.081)	-1.152 (1.908)	-1.101 (1.954)
Log total assets in 1998	1.462 (2.194)	0.125 (2.280)	-0.789 (2.209)	-0.258 (2.191)
Log capital intensity in 1997	-2.615 (1.922)	-2.085 (1.891)	-2.351 (2.057)	-1.868 (1.939)
Log capital intensity in 1998	2.385 (2.107)	1.380 (2.082)	1.958 (2.191)	1.217 (2.142)
Log total debt in 1997	-0.952 (0.689)	-1.243* (0.738)	-0.837 (0.717)	-0.949 (0.703)
Log total debt in 1998	0.784 (0.556)	0.893 (0.577)	0.835 (0.591)	0.892 (0.570)
OECD membership	-1.437 (1.410)	-3.068** (1.493)	-2.788** (1.327)	-3.226** (1.500)
Economic sectors:				
1 Basic resources	-2.184*** (0.640)	-2.562*** (0.682)	-2.795*** (0.727)	-2.569*** (0.678)
2 Cyclical goods	-1.767 (1.140)	-2.212* (1.304)	-2.472* (1.269)	-1.903 (1.200)
3 Energy	-2.468* (1.312)	-3.420*** (1.319)	-3.018** (1.351)	-3.459*** (1.324)
5 Health care	-2.241*** (0.777)	-2.360*** (0.795)	-2.607*** (0.819)	-2.356*** (0.786)
6 Industrial	-1.930*** (0.614)	-1.801*** (0.586)	-1.995*** (0.646)	-1.645*** (0.584)
7 Non cyclical goods	-3.713*** (0.724)	-4.023*** (0.782)	-4.319*** (0.828)	-3.971*** (0.764)
8 Technology	-3.782*** (0.823)	-4.086*** (0.866)	-4.393*** (0.887)	-3.910*** (0.825)
Regions:				
Europe	1.442** (0.576)	1.758*** (0.626)	1.687*** (0.619)	1.683*** (0.598)
Asia	0.331 (0.743)	-0.437 (0.698)	-0.273 (0.705)	-0.694 (0.697)
Australia	2.388** (1.068)	2.791** (1.148)	2.872** (1.148)	2.518** (1.149)
Africa	0.562 (1.695)	-0.007 (1.846)	-0.100 (1.740)	-0.272 (1.806)
Pseudo R ² {2}	0.266	0.284	0.324	0.274
Obs.	188	187	192	189

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors in parenthesis.

Control variables are economic sectors, region and OECD membership of the firm's country.

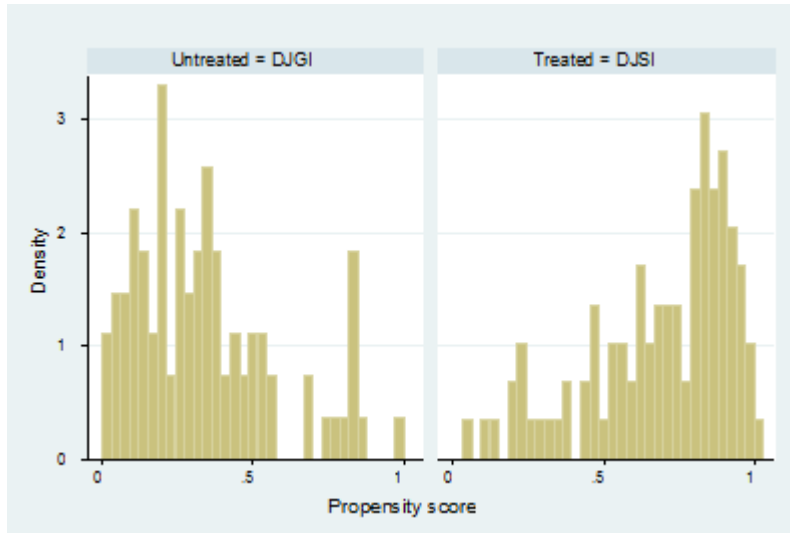


Figure 4: Density of propensity scores of DJSI and DJGI firms after logit with ROE.

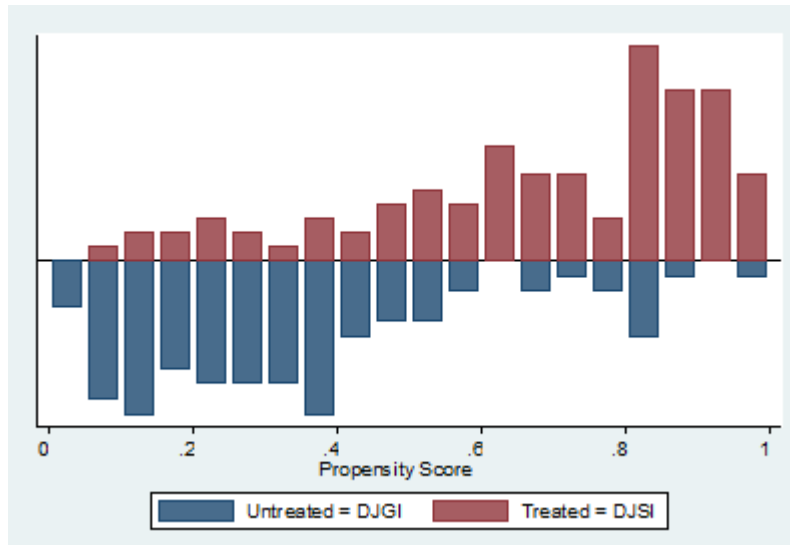


Figure 5: Propensity scores distribution of DJSI and DJGI firms after logit with ROE.

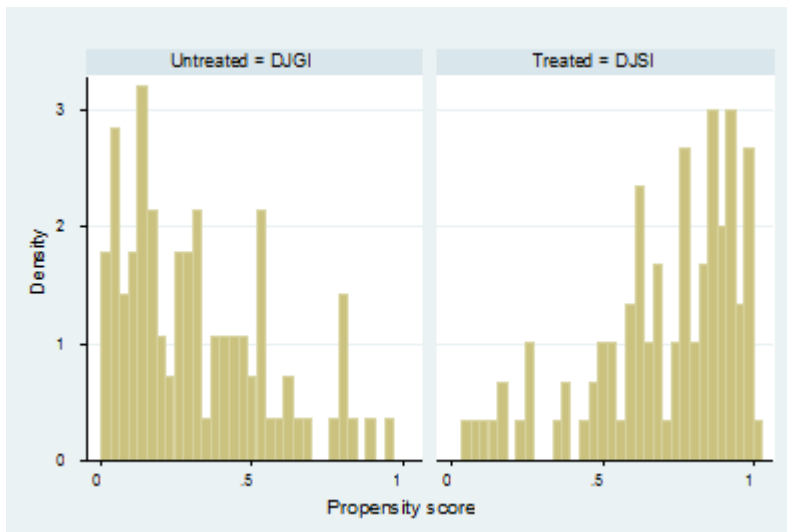


Figure 6: Density of propensity scores of DJSI and DJGI firms after logit with EBIT.

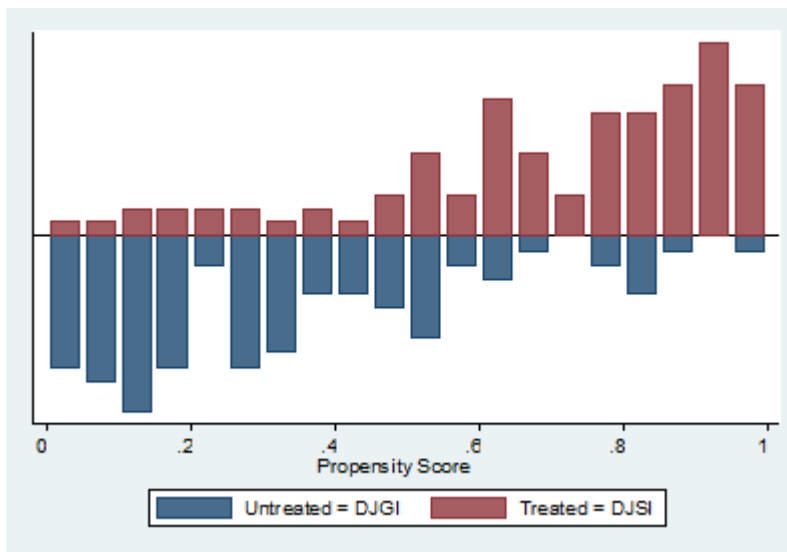


Figure 7: Propensity scores distribution of DJSI and DJGI firms after logit with EBIT.

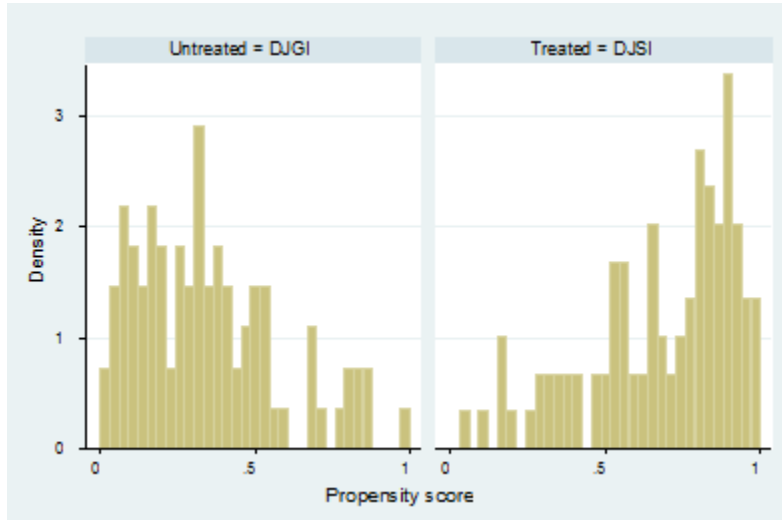


Figure 8: Density of propensity scores of DJSI and DJGI firms after logit with net margin.

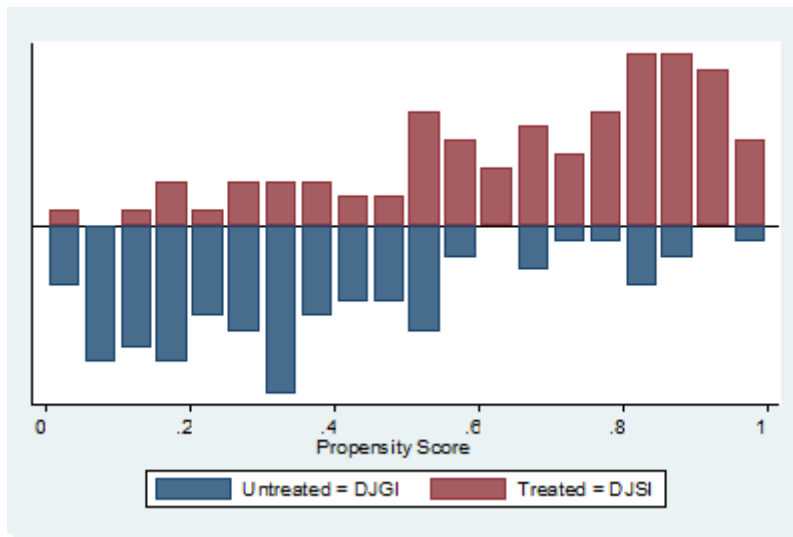


Figure 9: Propensity scores distribution of DJSI and DJGI firms after logit with net margin.

Table 5: Distribution of untreated and treated after logit estimation with log ROIC for nearest neighbor matching with 0.1 radius and no common support or trimming restrictions.

Distribution after probit with log ROIC for nearest neighbor matching with 0.1 radius.									
Variable	Sample	Treated	Controls	Difference	S.E.	T-stat	Treatment	On support	Total
Log ROIC in 1999	Unmatched	2.275	2.032	0.244	0.161	1.510	Untreated	63	63
	ATT	2.275	2.130	0.145	0.257	0.560	Treated	68	68
Log ROIC in 2000	Unmatched	2.345	2.247	0.098	0.144	0.680	Total	131	131
	ATT	2.345	2.312	0.032	0.234	0.140			
Log ROIC in 2006	Unmatched	2.504	2.222	0.282	0.136	2.080			
	ATT	2.504	2.579	-0.075	0.198	-0.380			

Note: Standard errors for ATT do not take into account that the propensity score is estimated.

Note: No common support restrictions or trimming is defined. The individuals on support are used for matching.

Table 6: Distribution of untreated and treated after logit estimation with log ROIC for nearest neighbor matching with 0.1 radius and 6% trimming restrictions.

Distribution after probit with log ROIC for nearest neighbor matching with 0.1 radius and 6% trimming.										
Variable	Sample	Treated	Controls	Difference	S.E.	T-stat	Treatment	Off support	On Support	Total
Log ROIC in 1999	Unmatched	2.275	2.032	0.244	0.161	1.510	Untreated	0	63	63
	ATT	2.248	2.084	0.164	0.260	0.630	Treated	4	64	68
Log ROIC in 2000	Unmatched	2.345	2.247	0.098	0.144	0.680	Total	4	127	131
	ATT	2.371	2.309	0.062	0.237	0.260				
Log ROIC in 2006	Unmatched	2.504	2.222	0.282	0.136	2.080				
	ATT	2.512	2.620	-0.108	0.201	-0.540				

Note: Standard errors for ATT do not take into account that the propensity score is estimated.

Note: The individuals on support are used for the matching.

Table 7: Average treatment effect on the treated (ATT) with propensity score matching.

Average treatment effect on the treated (ATT) with propensity score matching.								
Dependent variable	Log ROE		Log ROIC		Log EBIT		Log net margin	
	ATT	Std. Err.	ATT	Std. Err.	ATT	Std. Err.	ATT	Std. Err.
Radius matching								
Caliper = 0.1	0.330**	(0.167)	0.282**	(0.132)	0.471**	(0.226)	0.237*	(0.134)
Caliper = 0.08	0.120	(0.271)	-0.022	(0.268)	0.579	(0.419)	0.373	(0.309)
Caliper = 0.05	0.157	(0.324)	0.016	(0.272)	0.508	(0.572)	0.496	(0.364)
Caliper = 0.1 and 6\% trimmed	0.327*	(0.191)	0.291**	(0.148)	0.446*	(0.252)	0.231	(0.167)
Caliper = 0.08 and 6\% trimmed	0.093	(0.449)	-0.036	(0.232)	0.521	(0.444)	0.301	(0.313)
Caliper = 0.05 and 6\% trimmed	0.130	(0.336)	-0.011	(0.265)	0.508	(0.387)	0.430	(0.306)
Caliper = 0.1 and common support	0.331**	(0.154)	0.291*	(0.166)	0.437*	(0.252)	0.227	(0.195)
Caliper = 0.08 and common support	0.067	(0.364)	-0.036	(0.207)	0.524	(0.356)	0.209	(0.250)
Caliper = 0.05 and common support	0.100	(0.294)	-0.011	(0.223)	0.495	(0.396)	0.341	(0.266)
NN matching								
1to1	-0.014	(0.391)	0.282**	(0.136)	0.932	(0.628)	0.115	(0.356)
1to1 and 6\% trimmed	-0.014	(0.391)	0.282**	(0.136)	0.932	(0.628)	0.115	(0.356)
1to1 and common support	-0.102	(0.276)	-0.099	(0.324)	0.866*	(0.478)	-0.093	(0.319)
1to4	-0.075	(0.288)	-0.057	(0.276)	0.676*	(0.349)	0.080	(0.302)
1to4 and 6\% trimmed	-0.075	(0.288)	-0.057	(0.276)	0.676*	(0.349)	0.080	(0.302)
1to4 and common support	-0.065	(0.302)	-0.054	(0.252)	0.595	(0.391)	0.039	(0.260)
Kernel method								
without restrictions	0.060	(0.369)	0.282**	(0.136)	0.715	(0.535)	0.249	(0.379)
6\% trimmed	0.028	(0.374)	-0.031	(0.232)	0.651	(0.564)	0.183	(0.318)
common support	-0.012	(0.390)	-0.030	(0.271)	0.660	(0.504)	0.075	(0.308)
Local linear regrssion method								
without restrictions	0.067	(0.350)	-0.075	(0.302)	0.932*	(0.557)	0.115	(0.445)
6\% trimmed	0.036	(0.442)	-0.108	(0.301)	0.880	(0.568)	0.035	(0.396)
common support	-0.004	(0.327)	-0.099	(0.311)	0.866*	(0.505)	-0.093	(0.334)

Note: *** p<0.01, ** p<0.05, * p<0.10. Standard errors in parenthesis are bootstrapped. The ATT is estimated on the average profit means from 1999, 2000 and 2006.

