

The Economic Performance of European Stock Corporations. Does Sustainability Matter?

Klaus Rennings

Centre for European Economic Research
(ZEW)

Address: P.O. Box 103443,
D-68034 Mannheim
fon: +49/621/1235-207
fax: +49/621/1235-226
e-mail: rennings@zew.de

Michael Schröder

Centre for European Economic Research
(ZEW)

Address: P.O. Box 103443,
D-68034 Mannheim
fon: +49/621/1235-140
fax: +49/621/1235-223
e-mail: schroeder@zew.de

Andreas Ziegler

Centre for European Economic Research
(ZEW)

Address: P.O. Box 103443,
D-68034 Mannheim
fon: +49/621/1235-219
fax: +49/621/1235-226
e-mail: ziegler@zew.de

Abstract

Concerning the relationship between sustainability and economic performance, this paper examines econometrically the effect of environmental and social performance on the shareholder value of European stock corporations.

The shareholder value is measured as the average monthly stock return for the period from 1996 to 2001. The sustainability performance is measured independently by both an evaluation of the environmental and social risks of the industry to which the company belongs and by an evaluation of the environmental and social activities of a company relative to the industry average. Methodically, we apply two-stage econometric approaches which include recent insights from empirical finance. The most important result is that a higher environmental sector performance has a significantly positive influence on the shareholder value. In contrast, a higher social sector performance has a negative influence on the average monthly stock returns. This effect is partly less significant, however. The variables of the corporate environmental or social activities relative to the industry average have no significant effect on the shareholder value.

Introduction

Companies can have very different motives to improve their environmental or social performance. A central goal of environmentally friendly behaviour, for example, should be the conservation of living conditions on earth. This behaviour does not necessarily need an economic justification. However, for investors, shareholders, or managers, it is important to know the relationship between environmental or social activities of companies and the economic performance. Concerning public regulation, this issue is also relevant for policy decisions as for example disclosure regulations for Socially Responsible Investment (SRI).

In the SRI discussion, an integrated perspective of environmental and social performance is understood as sustainability performance. In this paper, based on an econometric analysis, we examine the effect of different variables measuring sustainability performance on the economic performance of European corporations quoted on the stock exchange. As a measure of the economic or financial performance, we consider the shareholder value since this concept is widely

used in corporations. Our concrete measure of the shareholder value is the average monthly stock return.

The sustainability performance is measured independently by both an evaluation of the environmental or social risks of the industry to which a company belongs and by an evaluation of the environmental and social activities of a company relative to the industry average. Concerning the first measure, it should be noted that companies can hardly influence the environmental or social risks of their respective industry. However, particularly large companies are able to restructure their investments towards industries with a higher sustainability performance. The second measure of sustainability performance refers to corporate activities reducing the sector specific environmental or social risks. Such a behaviour can be motivated, for example, by the compliance with environmental regulation. Especially environmentally friendly behaviour can also be motivated by the attainment of cost reductions due to less energy or material use and less waste production or higher market shares due to product integrated environmental innovations. These activities may also lead to increased competitiveness of corporations due to a sustainable management of resources, as postulated in the well-known Porter hypothesis (see Porter and van der Linde, 1995), and thus to a higher shareholder value. The opposite view is that environmental or social activities mainly induce higher costs and decreased competitiveness.

For the econometric analysis of the effect of sustainability performance on economic performance, we include recent insights from empirical finance which have not been considered in previous studies. The finance literature agrees that the estimated (so-called) beta parameters of the Capital Asset Pricing Model (CAPM) are not sufficient to explain the cross-sectional variation in average stock returns. An increased explana-

tory power has been identified when the market capitalisation and the book-to-market value ratio are used as explanatory variables (see Fama and French, 1992). A low market capitalisation and a high book-to-market value ratio tend to lead to higher average stock returns. Against this background, Fama and French (1993) have developed a multifactor model using the market capitalisation and the book-to-market value ratio for the construction of two additional factors to explain the expected stock returns. If econometric studies about the effect of sustainability performance on average stock returns are exclusively based on the CAPM (such as e.g. Muoghalu et al., 1990, Hamilton, 1995, Konar and Cohen, 1997, Khanna et al., 1998, Yamashita et al., 1999, Butz and Plattner, 1999), parameter estimations may be biased due to omitted variables. In this paper we examine two different two-stage econometric approaches to avoid this bias.

The next section compares our methodology with approaches of previous studies. The data for the econometric analysis are described in the third section. The fourth section specifies the applied econometric approaches and summarises the most important results. The fifth section draws some conclusions.

The relationship between sustainability and economic performance

Studies dealing with the relationship between sustainability and economic performance of companies can be divided into three groups according to their methodological basis: Analyses of fund performance, event studies (especially applying econometric methods with short observation periods) and econometric analyses with longer observation periods. Analyses of fund performance on sustainability divide corporations in different groups according to their environmental and/or social performance. They

consider either existing funds (see e.g. White, 1995, Statman, 2000, Kreander et al., 2000, Schröder, 2003) or virtual funds being constructed by the researcher (see e.g. Cohen et al., 1997, Yamashita et al., 1999). Such studies compare the economic (or financial) performance of portfolios that consist of companies with a higher sustainability performance to portfolios that consist of companies with a lower sustainability performance.

It should be noted that the financial success of existing funds depends heavily on the ability of the fund management. Studies on existing funds cannot separate these management effects from sustainability performance effects. But the main weakness of studies on fund performance in general is that only the average economic performance of all corporations in the portfolio is considered (see also Wagner, 2001). Consequently, the specific form of the influence of sustainability performance variables on the economic (or financial) performance can hardly be separated from other influences (particularly from the ability of the fund management, but also e.g. from the market capitalisation or from regional peculiarities) within this methodology. The identification of isolated effects needs econometric methods including all relevant variables to explain the economic performance besides the variables of interest (here the sustainability performance variables).

Econometric methods can be applied in the framework of so-called event studies (see e.g. Muoghalu et al., 1990, Hamilton, 1995, Klassen and McLaughlin, 1996, Konar and Cohen, 1997, Blacconiere and Northcut, 1997, Khanna et al., 1998, a combination of event studies and analyses of fund performance can be found in Yamashita et al., 1999). Event studies on sustainability performance analyse short-term reactions of stock prices due to the publication of particular environmental information about a company. These events typically have the character of

negative news such as information about hazardous accidents or about the emission data according to the Toxic Release Inventory (TRI). Only a few studies consider the effects of positive news such as information about companies winning environmental awards (see e.g. Klassen and McLaughlin, 1996, Yamashita et al., 1999). It can be argued that indicators such as TRI or hazardous accidents are weak since they only cover a small part of the sustainability performance of firms. But the main weakness of event studies is their short-term character. Short-term over-reactions of stock markets are possible that may be compensated over time. Consequently, the investigation of the general effect of sustainability performance on economic performance needs a long-term consideration.

Therefore, we consider a longer time-horizon in the econometric analysis of this paper. This methodology has received increasing attention in recent years due to the restrictions of analyses of fund performance and event studies on sustainability performance (see e.g. Hart and Ahuja, 1996, Butz and Plattner, 1999, Yamashita et al., 1999, Konar and Cohen, 2001, King and Lenox, 2001, Thomas, 2001). It should be noted that the existing econometric studies analysing the influence of sustainability performance on economic performance of corporations differ concerning the inclusion of the explanatory variables. Due to differences in selected variables, observation periods and regions the results of the studies can not be compared. Another factor that varies from study to study is the indicator of the sustainability and economic performance. These differences also exist in event studies and in analyses of fund performance.

In this paper, we use the shareholder value as a measure of the economic performance of companies. This concept has been established as an important goal in many companies with a strong influence on strategies and decisions (see Rapaport, 1986). In corporations quoted on the

stock exchange, the shareholder value can be calculated as the total return of stocks including both changes of stock prices and cash flows to the investor. Our concrete measure of the shareholder value is the average monthly stock return for the period from 1996 to 2001. This stock return based approach differs from other studies using accounting data such as Tobin's Q, return on assets, return on sales, or return on equity as a measure of economic performance (see e.g. Hart and Ahuja, 1996, King and Lenox, 2001, Konar and Cohen, 2001). In contrast to other stock return based econometric analyses with longer observation periods (see e.g. Butz and Plattner, 1999, Thomas, 2001) or event studies (see e.g. Muoghalu et al., 1990, Hamilton, 1995, Klassen and McLaughlin, 1996, Konar and Cohen, 1997, Khanna et al., 1998), more advanced approaches and particularly the multifactor model of Fama and French (1993) are applied in our study.

Furthermore, we measure the sustainability performance independently by both an evaluation of the environmental or social risks of the industry to which a company belongs (compared to other industries) and an evaluation of the environmental or social activities of a corporation relative to the industry average. In contrast, most other studies only use one-dimensional and more narrow measures of environmental performance. These approaches refer to temporarily environmentally friendly behaviour being published in newspaper articles (see e.g. Klassen and McLaughlin, 1996, Yamashita et al., 1999) or to temporary behaviour being harmful to the environment and leading to lawsuits or penalties due to non-compliance of environmental regulation (see e.g. Muoghalu et al., 1990).

Such negative consequences are often considered besides the emission data according to the TRI (see e.g. Cohen et al., 1997, Konar and Cohen, 2001). Several other studies only use the TRI data to measure the environmental per-

formance of companies (see e.g. Hamilton, 1995, Hart and Ahuja, 1996, Konar and Cohen, 1997, Khanna et al., 1998, King and Lenox, 2001). However, the TRI data seem to be a weak indicator for the entire environmental performance since they do not give any information about the pollution with non-toxic substances such as carbon dioxide emissions or with energy and material use. Other aspects, such as the existence of an environmental management system, are not included either. Consequently, general conclusions on the environmental performance cannot be drawn. Furthermore, a selectivity problem arises since studies based on the TRI data only include those companies (in the USA) that have actually emitted certain harmful substances.

Moreover, the measure of environmental performance (e.g. with emission data) often mixes two independent constituents: Corporate environmental activities compared to the other corporations of the sector and sector specific influences. Both components should be evaluated separately, however. But only a few studies examine these constituents. Cohen et al. (1997), for example, analyse the corporate environmental activities compared to the other corporations of the industry in their analysis of fund performance. Most notably, King and Lenox (2001) even investigate both constituents separately in their econometric analysis with longer observation periods. Finally, most studies only examine the environmental performance and neglect the social dimension of sustainability performance. The social part of sustainability performance is only considered in the investigation of ethical funds so far (see e.g. Statman, 2000, Kreander et al., 2000, Schröder, 2003). In contrast, the social dimension is generally missing in econometric studies with the exception of the examination of Butz and Plattner (1999).

Data

In our econometric analysis, we use data about the sustainability performance of companies that stem from the Swiss bank Sarasin & Cie in Basle. This bank has evaluated ca. 300 European corporations quoted on the stock exchange (date: September 2001) using environmental and social criteria. The stock corporations under consideration cover about 80% of the stock index of Morgan Stanley Capital International Ltd. (MSCI) for Europe. On the one hand, many of the evaluated companies are large. These companies are important for their sector and serve as a reference for the sustainability performance evaluation. On the other hand, corporations with a lower market capitalisation being relevant concerning their sustainability profile are also evaluated. Overall, large corporations are over-represented in the sample compared to their ratio in the population of all European corporations quoted on the stock exchange. However, this aspect is less relevant for the econometric estimations since the market capitalisation is included as a control variable to explain the average monthly stock return.

Concerning the environmental and social criteria, these ca. 300 companies have been evaluated by a technique developed by Sarasin & Cie. The evaluation criteria consider international standards of sustainability reporting such as the guidelines developed by the Global Reporting Initiative (2000). On the one hand, the evaluation of sustainability performance refers to the industry of the company, i.e. the extent of environmental or social risks of an industry is measured. Environmental criteria are the use of resources, emissions, and the degree of centralisation. Besides the degree of centralisation, social criteria for the evaluation of sectors are the pressures on social stability and the damage of individual values or rights. On the other hand, the evaluation of sustainability performance refers to the activities of a corporation to reduce the sec-

tor specific environmental or social risks relative to the sector average. Environmental criteria are drawn from the life cycle approach of a product, i.e. the corporate activities aiming at a reduction of environmental impacts are evaluated along the entire value chain (pre-production, production, use of products and services). Social criteria are drawn from the stakeholder approach, i.e. corporate activities are evaluated considering the relationships with different stakeholders (general public, suppliers, investors, employees, clients, competitors). All these different types of sustainability performance are evaluated on a five-stage scale (but in the econometric analysis, also dummy variables derived from the corresponding ordinal variables are used).

It should be noted that not all of the ca. 300 originally evaluated European stock corporations could be included in our econometric analysis. First of all, only those corporations are examined that have been quoted on the stock exchange during the complete period from January 1996 to August 2001. Furthermore, corporations were not considered if they have merged or been taken over during the observation period. In addition, we can only include companies when all relevant financial data is provided by the respective data base, i.e. Thomson Financial Datastream. All total return stock indices (that contain both changes of stock prices and cash flows to the investor) to compute the stock returns in addition to data on the market capitalisation and on the book-value must exist for the companies during the complete observation period. Altogether, we have considered 214 companies of the ca. 300 originally evaluated European corporations quoted on the stock exchange.

The period from January 1996 to August 2001 is chosen in order to get a sufficiently large number of companies with all relevant data. We could increase the number of stock corporations by using a shorter period, but the time series used for the estimation of the CAPM and the

multifactor model should not be too short. Therefore, the applied time interval between five and six years seems to be a reasonable compromise between the needs of a relatively large number of observations and a long observation period. This observation period covers both the strong world-wide increase in stock prices until the beginning of 2000 and the following decrease, particularly in the technology sector. The final date (August 2001) of the period has been chosen to avoid an influence of the stock market disturbances after the terror attack of September 11th in New York on the estimation results.

In the econometric analysis, we (partly) use the market capitalisation and the book-to-market value ratio of each company at the beginning of the observation period (i.e. in January 1996) as control variables to explain the average monthly stock returns. These two variables are denominated in Swiss Francs (SFR) according to the Thomson Financial Datastream database. Note that some corporations have split their equity capital into different types of stocks, for example, common and preferred stocks. In these cases, the market capitalisation and the book-to-market value ratio as well as especially the stock returns are calculated using that type of equity capital with the highest number of stocks in 2001. In order to check for a possible distortion of the estimation results due to neglecting a relevant type of equity capital, the econometric analysis is also performed using those companies with only one essential type of equity capital. But the consideration of these 175 (out of 214) companies does not yield qualitatively different results.

Besides the financial variables, country dummies are always and industry dummies are partly used as additional control variables to explain the average monthly stock returns. These dummy variables cover potential influences on the shareholder value which are country and sector specific. The 214 European companies included

in the econometric analysis stem from the United Kingdom, Switzerland, Germany, the Netherlands, France, Sweden, Italy, Austria, Spain, Denmark, Finland, Norway, and Belgium. The industry dummies refer to the technology, banking, insurance, and construction sector. For the econometric analysis, we calculate the stock returns using total return indices from the Thomson Financial Datastream database, denominated in SFR. Furthermore, the estimation of the CAPM and the multifactor model requires the inclusion of the return on a market portfolio of stocks and the risk-free interest rate. In this respect, the return index on a market portfolio of stocks is represented by the Financial Times Stock Exchange (FTSE) Eurotop 300 index (this index covers the 300 European companies with the highest market capitalisation). The risk-free interest rate is represented by the return of a Swiss government bond with a constant duration of one month.

Econometric analysis

In the first stage of the first econometric approach, the CAPM is estimated for each of the 214 European companies under consideration using ordinary least squares (OLS). Thus, the excess return of the stocks is only explained by the excess return on the market portfolio of stocks. As a result, one receives the corresponding estimated beta parameter for each of the companies. These parameter estimates are then used as control variables to explain the average monthly stock returns between 1996 and 2001 in the second stage regression model. Indeed, in their well-known article, Fama and French (1992) show that the estimated beta parameters do not sufficiently well explain the cross-sectional variation in average stock returns. They propose to include two additional variables, the market capitalisation and the book-to-market value ratio. Since it is now common practice, we also consider these two variables together with

the estimated beta parameters in the second stage regression model. Note that these two variables are constructed at the beginning of the observation period to avoid problems with the use of the endogenous variables. Furthermore, country and sector dummies are considered as additional control variables. But in particular, the actually interesting environmental and social performance variables discussed above are included as explanatory variables in the second stage regression model.

Fama and French (1993) propose to expand the CAPM by two additional variables to explain the expected stock returns. These factors result from the difference between the stock returns of corporations with a small market capitalisation and a big market capitalisation as well as from the difference between the stock returns of corporations with a high book-to-market value ratio and a low book-to-market value ratio. The arising multifactor model usually has a stronger explanatory power than the CAPM (see e.g. Fama and French, 1996, Davis et al., 2000, Berkowitz and Qiu, 2001). Hence, such a model is estimated for each of the 214 European companies under consideration in the first stage of the second econometric approach (for details see Ziegler et al., 2002). As a result, one receives the corresponding three (OLS) estimated parameters for each of the companies. Similar to the first approach, we use these (now for each company three) parameter estimates as control variables to explain the average monthly stock returns. Furthermore, country and sector dummies are included again. Since the market capitalisation and the book-to-market value ratio are considered in the derivation of the multifactor model, these variables are not considered as control variables. But the most important explanatory variables in the second stage regression model are again the environmental and social performance variables. The econometric analysis with both approaches (see in detail Ziegler et al., 2002) shows that a

higher environmental sector performance (i.e. a lower extent of environmental risks) has a significantly positive effect on the average monthly stock return between 1996 and 2001. According to this result, the stock market rewards investments in stock corporations of clean sectors (with otherwise similar economic characteristics, e.g. concerning financial variables) with a premium. This influence is particularly strong for companies with the two highest evaluations of the environmental sector performance compared to companies with lower evaluations. In contrast, an increasing social sector performance has a negative effect on the average monthly stock return. Consequently, the stock market penalizes investments in stock corporations of sectors with a high social performance (and otherwise similar economic characteristics) with a negative premium. But the latter effect is statistically less robust than the prior effect.

Some sectors with a very high evaluation of the environmental performance are often considered as sectors with a lower sustainability performance. This is particularly true for the banking and the insurance sector. Both industries have the second lowest evaluation of the social performance. In further examinations, variables of an overall sustainability performance (i.e. environmental and social performance) of the sector are included to explain the average monthly stock return between 1996 and 2001. These variables have in most cases no significant influence due to the obvious rivalry between the positive effect of a high environmental sector performance and the negative effect of a high social sector performance. But some of these variables actually have a significantly positive effect. Thus, investments in stock corporations of sectors with a high overall sustainability performance seem to be at least as good as investments in other stock corporations (with otherwise similar economic characteristics). Accordingly, this restriction of

the investment universe should not reduce the average stock return of the investor.

Finally, for the variables of the corporate environmental or social activities relative to the sector average, no significant effect on the average monthly stock return between 1996 and 2001 can be found. Consequently, a strong environmental or social behaviour of the management of a company does not improve the shareholder value. But obviously, this sustainable behaviour does not have a negative influence, either. Thus, concerning the average monthly stock return, such corporate environmental and social activities can be increased without losses in competitiveness. Concerning the investor view, investments in stock corporations with higher environmental or social activities compared to the other corporations of the sector do not result in lower average monthly stock returns than investments in other stock corporations (with otherwise similar corporate properties).

Conclusions

Summing up, the question in the title of our paper can be answered with: yes, the single components of sustainability matter. Higher environmental sector performance has a significantly positive effect on the shareholder value. In contrast, an increasing social sector performance has a negative effect on the average monthly stock return. Variables of an overall sustainability performance of the sector have in most cases no significant influence due to the obvious rivalry between the positive effect of a high environmental sector performance and the negative effect of a high social sector performance. Moreover, sustainability performance within a sector does not make a difference concerning shareholder value.

An optimist may conclude that investments in stock corporations of sectors with a high overall sustainability performance seem to be at least as

good as investments in other stock corporations (with otherwise similar economic characteristics). A pessimist may conclude that a better sustainability performance does not lead to higher competitiveness compared to corporations that do not enforce such activities. Thus, due to profit maximisation, many companies may not perform sustainable activities although this would be socially desirable.

The results are however relevant with regard to the international trend of SRI disclosure regulation for pension funds. In 2000, the United Kingdom has introduced an obligatory Statement of Investment Principles (SIP) for pension funds. In this statement, the funds have to declare their environmental, social, and ethical investment criteria. A similar regulation was introduced in Germany by the so-called Riester-pension reform, that is voluntary additional private savings for retirement. The certificate for the Riester-pension requires that the investor declares his investment policy, including environmental, social, and ethical criteria. Moreover, in the meanwhile nearly all governments and international organisations (including multinational firms and/or business associations) have signed commitments to the principles of sustainable development. Regarding the results of this study, these governments and organisations (including all their dependencies) should consider an extended SIP in the sense that funds with a higher sustainability performance are in general preferred (with otherwise similar economic characteristics).

Concerning the econometric analysis of this paper, it should be noted that the results are based on the investigation of the average monthly stock returns of European corporations quoted on the stock exchange during the period from 1996 to 2001. The region under consideration and the observation period could strongly influence the estimation results on the effect of sustainability performance on economic per-

formance. To our knowledge, there are no comparable studies for European companies using this observation period and especially using these measures of sustainability and economic performance as well as applying these econometric approaches. Therefore, the results of this paper cannot be directly compared with the results of other econometric analyses with longer observation periods which mostly concentrate on the United States. The time-horizon used in our study is also relatively short. The period from 1996 to 2001 is among others characterised by a strong general increase in stock prices until 2000 and then by a collapse particularly of the stock prices of the technology sector. Although possible sector effects are controlled for by including additional dummy variables, there might be an influence on the estimation results that stems from the specific observation period.

Methodically, another difficulty is the fundamental assumption of the econometric models used in this paper. The models imply that the variables of the (average) sustainability performance (between 1996 and 2001) influence the average monthly stock return (between 1996 and 2001). But it might also be possible that a relatively successful company (or sector) can afford to increase the environmental or social performance. If such a reverse effect exists, the estimations of the parameters would be biased. With regard to the causality of the relationship between environmental and economic performance, often lagged explanatory variables are used in other studies. That is, the effect of environ-

mental performance on economic performance one or more years later is examined (see e.g. Hart and Ahuja, 1996, King and Lenox, 2001, Konar and Cohen, 2001). But all these studies are based on the TRI data. Despite the problem of subjectiveness, it seems that the evaluations applied in our paper are a better indicator for the entire environmental performance than measures based on the TRI data. In the future, we should also use lagged explanatory variables within the econometric models. But the necessary time series of sustainability evaluations are not available yet.

If we were able to apply such time series of sustainability evaluations, we could connect these lagged explanatory variables with panel models (one example for the application of panel models is King and Lenox, 2001). In the framework of such models, possible intertemporal effects on the endogenous variable such as the stock returns could be considered. If intertemporal effects existed and if they were not modelled, the estimation of the parameters would be biased. But as already mentioned, the condition for the application of panel models are time series of evaluations of the environmental and/or social performance which are not available yet. Finally, it should be noted that the causality problem of the relationship between sustainability and economic performance can be analysed by simultaneous equation models. The consideration of such models would also be desirable in future investigations.

References

- Berkowitz, M.K., and J. Qiu (2001), *Common Risk Factors in Explaining Canadian Equity Returns*, Discussion Paper, University of Toronto.
- Blacconiere, W.G., and W.D. Northcut (1997), "Environmental Information and Market Reactions to Environmental Legislation", *Journal of Accounting, Auditing and Finance* 12 (2): 149-178.
- Butz, C., and A. Plattner (1999), *Nachhaltige Aktienanlagen: Eine Analyse der Rendite in Abhängigkeit von Umwelt- und Sozialkriterien*, Sarasin Studie, Basel.

- Cohen, M.A., S.A. Fenn, and S. Konar (1997), *Environmental and Financial Performance: Are They Related?*, Discussion Paper, Vanderbilt University.
- Davis, J.L., E.F. Fama, and K.R. French (2000), "Characteristics, Covariances, and Average Returns: 1929 to 1997", *The Journal of Finance* LV (1): 389-406.
- Fama, E.F., and K.R. French (1996), "Multifactor Explanations of Asset Pricing Anomalies", *The Journal of Finance* LI (1): 55-84.
- Fama, E.F., and K.R. French (1993), "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics* 33: 3-56.
- Fama, E.F., and K.R. French (1992), "The Cross-Section of Expected Stock Returns", *The Journal of Finance* XLVII (2): 427-465.
- Global Reporting Initiative (2000), *Sustainability Reporting Guidelines on Economic, Environmental, and Social Performance*, Boston.
- Hamilton, J.T. (1995), "Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data", *Journal of Environmental Economics and Management* 28: 98-113.
- Hart, S.L., and G. Ahuja (1996), "Does it Pay to be Green? An Empirical Examination of the Relationship Between Emission Reduction and Firm Performance", *Business Strategy and the Environment* 5: 30-37.
- Khanna, M., W. Rose, H. Quimio, and D. Bojilova (1998), "Toxics Release Information: A Policy Tool for Environmental Protection", *Journal of Environmental Economics and Management* 36: 243-266.
- King, A., and M. Lenox (2001), "Does it Really Pay to be Green?", *The Journal of Industrial Ecology* 5 (1): 105-116.
- Klassen, R.D., and C.P. McLaughlin (1996), "The Impact of Environmental Management on Firm Performance", *Management Science* 42 (8): 1199-1214.
- Konar, S., and M.A. Cohen (2001), "Does the Market Value Environmental Performance?", *The Review of Economics and Statistics* 83 (2): 281-289.
- Konar, S., and M.A. Cohen (1997), "Information as Regulation: The Effect of Community Right to Know Laws on Toxic Emissions", *Journal of Environmental Economics and Management* 32: 109-124.
- Kreander, N., R.H. Gray, D.M. Power, and C.D. Sinclair (2000), *Evaluating the Performance of Ethical and Non-Ethical Funds: A Matched Pair Analysis*, Discussion Paper, University of Dundee.
- Muoghalu, M.I., H.D. Robison, and J.L. Glascock (1990), "Hazardous Waste Lawsuits, Stockholder Returns, and Deterrence", *Southern Economic Journal* 7 (2): 357-370.
- Porter, M., and C. van der Linde (1995), "Green and Competitive: Ending the Stalemate", *Harvard Business Review* Sept-Oct: 120-134.
- Rappaport, A. (1986), *Creating Shareholder Value*, The Free Press, New York.
- Schröder, M. (2003), *Socially Responsible Investments in Germany, Switzerland and the United States – An Analysis of Investment Funds and Indices*, Discussion Paper No. 03-10, Zentrum für Europäische Wirtschaftsforschung (ZEW), Mannheim.
- Statman, M. (2000), "Socially Responsible Mutual Funds", *Financial Analysts Journal* 56 (3): 30-39.

- Thomas, A. (2001), "Corporate Environmental Policy and Abnormal Stock Price Returns: An Empirical Investigation", *Business Strategy and the Environment* 10: 125-134.
- Wagner, M. (2001), *A Review of Empirical Studies Concerning the Relationship between Environmental and Economic Performance*, Center for Sustainability Management, University of Lueneburg.
- White, M.A. (1995), "The Performance of Environmental Mutual Funds in the United States and Germany: Is there Economic Hope for Green Investors?", *Research in Corporate Social Performance and Policy*, Suppl. 1: 323-344.
- Yamashita, M., S. Sen, and M.C. Roberts (1999), "The Rewards for Environmental Conscientiousness in the U.S. Capital Markets", *Journal of Financial and Strategic Decisions* 12 (1): 73-82.
- Ziegler, A., K. Rennings, and M. Schröder (2002), *Der Einfluss ökologischer und sozialer Nachhaltigkeit auf den Shareholder Value europäischer Aktiengesellschaften*, Discussion Paper No. 02-32, Zentrum für Europäische Wirtschaftsforschung (ZEW), Mannheim.