Environmental Sustainability's Impact On Earnings

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ABSTRACT

There is ever increasing social pressure for businesses to adopt sustainable methods of production to minimize environmental impacts. While this may be laudable, businesses have a responsibility to their stakeholders to maximize financial results. These potentially competing objectives are often referred to as part of the "triple bottom line". In this paper, we restrict our attention to the original bottom line, Earnings per Share, and the Environmental bottom line of conserving resources. Focusing on the health care sector, we find a clear relationship between EPS and the adoption of sustainable practices. We augment this study with a look at expectations. That is, to what extent are sustainable business practices affecting the financial market's assessment of expected future success v. current financial success? Future expectations could be affected if environmental initiatives signal enlightened leadership or if a business that adopts environmental initiatives is thus well-positioned to face regulatory uncertainty in the future. Either of these management advantages would raise expectations of future success and thus be reflected in higher stock prices today, beyond what is currently captured in earnings ratios.

Keywords: Environmental Ranking; Financial Performance; Health Care Industry

INTRODUCTION

*I*t's a perfect storm – but a positive one. Two strong forces today are converging in the U.S. manufacturing sector that can deliver a whirlwind of benefits for those companies – and the environment. First, at long last, American industrial executives are recognizing the importance of preserving and enhancing the use of our precious natural resources through green energy practices in a vast array of manufacturing applications. Second, it's now apparent to most manufacturers that this altruistic perspective, unlike many, can positively impact bottom lines and deliver cost-saving benefits short term and long term."

– Gerald Shenel, Fabricators and Manufacturers, Int'l.

Anecdotal evidence points to areas where firms can realize cost savings from waste reduction and energy-saving policies. In this paper we take a more robust approach to assessing the feasibility of sustainable business practices; using regression analysis we measure the impact of such policies on a firm's financial performance. Furthermore, we extend the analysis to identify the impact of *expected* benefits from *current* benefits. That is, does sustainable business practice do more than simply affect today's bottom line (i.e. through cost savings), does it also signal enlightened management or more desirable products due their aura of social responsibility, impacting future expectations?

LITERATURE REVIEW

Assessing the impact of sustainable business practices is a challenge on several fronts. One is that the concept of sustainability in business does not have one dominant definition. An early and widely accepted definition of Sustainability, provided by the *World Commission on Environment and Development* (1987), is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This was further developed in 1997 when John Elkington coined the phrase "the triple bottom line" to redefine

corporate success as performance in three areas: economic prosperity, environmental quality and social justice. This is elucidated in his book, "Cannibals with Forks" which was named after the quote, "Is it progress if a cannibal uses a fork?"by Polish poet Stanislaw Lec.

In business, sustainability has been defined in greater detail: transparent ethical codes, environmental stewardship, and human capital development, which could lead to better corporate performance in the long run (Lopez 2007). Further definition of a sustainable organization is provided by the Dow Jones Sustainability Group, in partnership with the SAM Sustainability Group in Zollikon, Switzerland in 1999. In order for a company to be in the Dow Jones Sustainability Index (DJSGI), they must follow these sustainability practices (Knoepfel, 2001):

- **Innovation:** Investing in product and service innovations leading to a more efficient, effective and economic use of financial, natural and social resources over the long term.
- **Governance**: Setting the highest standards of corporate governance, including management quality and responsibility, organizational capability and corporate culture.
- **Shareholders**: Meeting shareholders' demands for sound financial returns, long term economic growth, long-term productivity increases, sharpened global competitiveness and contributions to intellectual capital.
- **Leadership**: Leading the industry toward sustainability by setting standards for best practice and maintaining superior performance.
- **Society**: Encouraging long lasting social well being in local and global communities, interacting with different stakeholders (e.g. clients, suppliers, employees, government, local communities and NGOs). and responding to their specific and evolving needs thereby securing a long term ''license to operate'' and superior customer and employee loyalty.

Early on in the sustainability movement, Paul Hawken described how businesses can learn from the ecological systems; that is business can mimic the intelligence of nature they will not only be more sustainable but highly efficient as well. His simple principles include:

- In Nature, all **waste equals food** – that is the outputs of every economic or business process should serve as the inputs to another process
- Nature runs off **solar** income- the sun's radiation is the only energy that does not run down and we should increasingly rely on it
- Nature depends on **diversity**- the survival of the earth's living systems relies on biodiversity and it should therefore not be compromised by business activities.

While definitions of Sustainability differ, measuring a company's progress in this area is further complicated by the fact that these measures often rely on self-reporting. According to Knoepfel (2001), input sources for the DJSGI consist of "responses to the corporate sustainability questionnaire, submitted documentation, policies and reports and publicly available information." Regarding measures of sustainability, Matthews and Rusinko (2010) identify necessary conditions for sustainability to become a part of corporate reporting, "analogous and as familiar as accounting and financial reporting standards". As various researchers and corporate analysts increase the focus in this arena, a better understanding of what we seek to measure and how we can measure it emerges.

The process of identifying and ranking firms can also differ. The Dow Jones Sustainability Group Index (DJSGI) identifies the top 10% businesses according to their corporate sustainability performance in each of 64 industry sectors (Knoepfel 2001). Once sustainable firms are identified, *then* their financial performance is observed. Another source of sustainability metrics is Newsweek; their ranking of green firms identifies the top financial performers *and then* ranks their sustainable practices.

Newsweek created a composite Green Ranking of the top 500 US companies in partnership with various top environmental researchers. MSCI ESG Research provides the *Green Policies* score (45% weight in the Green Ranking composite) – an analytical assessment of the companies environmental policies and initiatives. Trucost, which specializes in quantitative measures of environmental performance, compiled the *Environmental Impact*

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Score (45% weight), based on over 700 metrics including green house gas emissions, water use, and solid waste disposal. CorporateRegister.com, the world's largest directory of *sustainability and environmental reports*, provided the surveys of academicians, CEOs and environmental officers to create a Reputation Score (10% of the composite score) (The Daily Beast, 2011). Parts of the overall Green Ranking may be subject to bias; Dawkins and Fraas identify a positive relationship between companies' voluntary environmental disclosure and environmental performance among the S&P 500 companies. This suggests that self-reporting may be self-serving, introducing bias into the Newsweek composite Green Ranking. As a result, in our analysis, we use the Trucost Environmental Impact Score, published in October of 2011 for 2010.

Trucost's proprietary model measures over 100 environmental impacts. The model tracks 464 industries world-wide with an input-output model that is designed to track exchanges and cash flows between sectors allowing effective measurement of the entire supply chain impacts. The model develops an environmental profile, for each of the 464 sectors. It then uses a benchmark to calculate the environmental impact per dollar of revenue for each sector. This sectoral analysis enables Trucost to estimate the impact from the companies supply chain and their investment portfolio in addition to their direct operations. This in depth perspective produces a comprehensive estimate of the total environmental impact of the company.

The process begins by using the company's financial information to apportion their business activities into the appropriate sectors. After identifying magnitude of operation in each of the relevant sectors for the firm's direct operations, the supply chain, and the investments, Trucost applies these magnitudes to the environmental impact for the sector. After determining the environmental impacts Trucost calculates a dollar value of the damage to society caused by each impact. By summing these, Trucost calculates a dollar estimate of the environmental impact of the company. These environmental cost estimates are then normalized based on the company's annual revenue to account for size and reported on a 100-point scale. An independent advisory panel reviews the results and methodology.

On September 14, 2010 Trucost's unique methodology and assessment received a U.S. Patent for their "method and system for calculating an environmental score for a business unit". Another indication of the quality and completeness of Trucost 's methodology is that it was chosen by Standard & Poor's to evaluate companies for their S&P US Carbon Efficient Index which tracks around 350 companies selected for their carbon efficiency. Newsweek has used Trucost for the last 3 years for the environmental impact component of their overall green score while they have changed the providers of other components of the composite score, evidencing greater reliability of this measure. Based on the comparability over time, use of publically available environmental data whenever available, and the rigorous input-output model, we find that Trucost's quantitative, standardized ranking is a valid measure of the company's environmental impact.

SUSTAINABILITY AND PROFITABILITY

Many attempts have been made to analyze the link between corporate performance and sustainable practices with various and even contradictory results (Adams and Zushi, 2004; Ángeles Gil Estallo, 2007, Bromley and Marcus, 1989; Carrasco, 2007; Evans, 2003; McWilliams and Siegel, 2000; Wenzel and Thiewes, 1999).

Ivo Knoepfel, Head of Rating and Index Research for SAM Sustainability Group, compared the performance of firms listed in the Dow Jones Sustainability Group Index (DJSGI), which he helped construct, to those in the Dow Jones World Index (DJWI). He reports DJSGI has better than average return on equity, on investments, and on assets from the years Dec 1993 to August 2000 based on data for all firms in the two indices. The higher returns for the sustainable firms are explained by fewer negative surprises for companies that use sustainable business practices leading to above average growth. Knoepfel points out that corporate sustainability may also be a proxy for "enlightened and disciplined management – which is one of the most important factors that investors consider in buying a stock." These managers are expected to anticipate market opportunities for sustainable products and services while mitigating risks and reducing sustainability costs to create shareholder value (Knoepfel, 2001).

A later study using the DJSGI yields contradictory results; Lopez, Garcia and Rodriguez (2007) find a negative impact on performance for firms in the DJGSI in the short term. For the period 1998-2004, they use data

for 55 sustainable firms in the DJSGI, *matched* to 55 firms in the DJWI that are not in the Sustainability index. The study focuses on European firms where the "degree of development of sustainability practices is similar" with "proactive policies related to the environment and human resources." They regress Profit Before Tax (PBT) on Revenue and a dummy variable for the DJSGI, with size, risk and industry included as control variables. The negative relation found indicates the "introduction of the philosophy of sustainability involves a cost or reallocation of resources that negatively affects the firm's performance." (Lopez, 2007, p.293) Further analysis shows that the earlier increased costs (1998-2002) eventually have positive impacts on profitability for the sustainable firms but only for a few years; the matched firms not in the DJSGI regain the equivalency in financial performance perhaps because they imitate the DJSGI firms and learn to control the costs.

Anecdotally, many green companies report reduced costs due to energy saving or waste reduction but sustainability is more than this. KPMG (2012) notes that companies that report Corporate Responsibility find financial value and enhanced innovation, citing the old adage "what gets measured gets managed". The financial value comes from direct cost savings and enhanced reputation from both investors and consumers. This may be exemplified by IBM which not only reduced energy costs by \$400 million between 1990 and 2010, it creates software that clients can use to operate more efficiently, taking the understanding of sustainability a step further than just cost-reduction (Yarett, 2011). A study of electronics firms (Salam 2011) finds 'buyer's pressure on suppliers' to be the strongest predictor of adoption of green procurement practices; suppliers that do so create a competitive differentiation. This competitive differentiation or reputational advantage may wear out as green products become more the norm.

To get an overview of firms' sustainability practices, Ernst & Young surveyed 300 leaders of big global firms (The Economist, 2011), 44% said their spending on sustainability had increased since 2008 and 44% stayed the same despite the weak economy, mostly in energy efficiency and waste reduction. This may be explained by the falling price of renewable energy, potential green subsidies, and planning for a world of increasingly scarce natural resources and thus higher prices. In some cases, the firms are reacting to initial attacks by environmental activists and some are designing products for the resource constrained markets of India and China where products that use less resources will be necessary (i.e., low suds detergents that require less water to rinse). The Economist concludes that "clean firms can make filthy cash".

HYPOTHESES

If practicing sustainable environmental policies is good for the bottom line, we expect b_1 to be positive and significant, controlling for the risk, reward characteristics of the companies in the health care industry. The control variables help " ensure that what we're testing is the *only thing* that we're testing, so we need to be sure that we're considering all factors that can influence the result, and then we "fix" those factors in place so that they can't influence our results" (Weber, 2008).

Regression 1:   EPS = f (environmental impact │ control variables for firm success and risk)
$\quad$ H_o: $b_1 = 0$
$\quad$ H_1: $b_1 \neq 0$ $\qquad$ where b_1 is the environmental impact coefficient

Next we examine if the results capture expectations via the stock price; the stock price should capture expectations of future prices and dividend stream, thus the Dependent Variable is EPS/P.

Regression 2:   EPS/P = f (environmental impact │ control variables for firm success and risk)
$\quad$ H_o: $b_2 = 0$
$\quad$ H_1: $b_2 \neq 0$ $\qquad$ where b_2 is the environmental impact coefficient and also captures future expectations embedded in stock price

DATA

The literature review discusses the Trucost ranking which we use for our environmental impact ranking. Following is a discussion of the financial ratios and then the descriptive statistics for the data set are presented.

Earnings Per Share (EPS) is one of the most widely used and important metrics used to indicate a company's profitability and financial strength. In managerial finance, EPS is called the bottom line, denoting that, of all the items on the income statement, it is the most important. It captures both the revenues generated and the costs incurred during the reporting period. (Weston et al.) EPS allows us to follow a company's profitability over time and compare one company to another.

Price Earnings Ratio (P/E) is simply a comparison of a company's current price compared to its per-share earnings. It is a "real" number in that it compares reported earnings with the current price of the stock. The P/E is often referred to as the "stock's multiple" as it indicates how highly investors value the earnings of a company. For example, two companies may each report earnings of $1.00 but may be priced differently by the market due to expectations. The P/E ratio may vary widely from one industry to another and factors such as age of the company (startup), size (market capitalization), type (utility/technology), growth expectations and other factors impact the multiple. In spite of these factors, the P/E ratio is the most basic and frequently used method for comparing companies on a cost basis and many analyses use the P/E as a gauge of value. The calculation of the ratios for this study is based on trailing earnings rather than an estimate of future or expected earnings in the denominator; expectations are captured by the stock price in the numerator.

Control Variables:

Return on Assets (ROA) tells an analyst how much profit a company generates for each $1.00 of assets. It is a good indicator of the capital intensity of a company. For example, railroads and steel mills are capital intensive and financial services and software companies usually do not have large investments in assets. ROA measures the relationship between all of a firm's assets (shareholders equity and borrowed funds) to its earnings. It may be considered one of the strongest tests of return to stockholders.

Beta is a measure of volatility or systematic risk associated with a stock or group of stocks in comparison to the market as a whole. It may be thought of as the tendency of the returns on a stock to be affected by swings in the general market. A stock with a Beta equal to 1 will move with the market, less than 1 the price will not fluctuate as widely as the market and a stock with a Beta greater than 1 will be more volatile than the market as a whole. (Investopedia.com)

DESCRIPTIVE STATISTICS

Of all of the firms ranked in the top Fortune 500 in the health care industry, and of these, ones ranked by Trucost for their environmental practices, we obtain 49 firms. This minimizes noise in the data, and will allow us to run comparisons with other sector in the future. The descriptive statistics for the population studied follows.

	min	max	mean	median	std dev
EPS	0.37	7.88	3.218163	3.42	1.619593
P/E	5.86	40.86	17.25122	15.06	7.841232
1/P/E	0.024474	0.170648	0.069158	0.066401	0.029671
ROA	0.028	0.37	0.111673	0.094	0.07292
Envtl. Impact	46.9	86.9	66.05102	61.9	9.765759
Beta	0.29	2.25	0.874286	0.8	0.418375
Div Yield	0	0.049	0.011041	0.005	0.013954
Sales in billions	2.09	119.8	24.29102	9.52	29.80428
Green Score	43.3	74.9	55.85102	54.8	8.630183
Envtl. Mgmt	34.4	96.2	52.88367	45.8	16.06703
Disclosure	0	82.1	23.38571	16.7	24.54468
Net Margin	0.007	0.338	0.108041	0.09	0.077821
ROE	0.051	0.739	0.222796	0.185	0.14816

RESULTS

First we regress Earnings per share (EPS) as a measure of financial performance on the ranking of the Environmental Impact of the firm, with ROA and Beta as control variables.

The Environmental Impact Variable is positive and significant. An adjusted R^2 of .358 is quite respectable for cross-section data and the coefficients are significant at the 99% level for both ROA (as expected for the control variable) and Environmental Impact. The Beta is significant at the 90% level and the constant at the 95% level.

SUMMARY OUTPUT   EPS

Regression Statistics	
Multiple R	0.630807
R Square	0.397918
Adjusted R Square	0.357779
Standard Error	1.297921
Observations	49

ANOVA

	df	SS	MS	F	Significance F
Regression	3	50.10098	16.70033	9.913534	3.9E-05
Residual	45	75.80695	1.684599		
Total	48	125.9079			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	-3.86741	1.502958	-2.5732	0.013443	-6.89453	-0.8403	-7.90975	0.174919
ROA	8.137118	2.815019	2.890609	0.005899	2.46738	13.80686	0.565886	15.70835
Envtl. Impact	0.106111	0.02106	5.038573	8.09E-06	0.063695	0.148527	0.049469	0.162753
Beta	-0.95148	0.487342	-1.95238	0.057131	-1.93303	0.03008	-2.26223	0.359271

Next we regress EPS combined with the stock price, in the form 1/(P/E). We invert the P/E ratio in order to use EPS/P so that the coefficients may be more comparable between regressions.

SUMMARY OUTPUT   1/(P/E)

Regression Statistics	
Multiple R	0.567068
R Square	0.321566
Adjusted R Square	0.276337
Standard Error	0.025241
Observations	49

ANOVA

	df	SS	MS	F	Significance F
Regression	3	0.013588	0.004529	7.109731	0.000521
Residual	45	0.028669	0.000637		
Total	48	0.042257			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	-0.00557	0.029228	-0.19045	0.849816	-0.06443	0.053302	-0.08418	0.073044
ROA	0.139131	0.054743	2.541518	0.014552	0.028872	0.24939	-0.00811	0.286368
Envtl. Impact	0.000389	0.00041	0.94981	0.347282	-0.00044	0.001214	-0.00071	0.001491
Beta	0.03831	0.009477	4.042285	0.000204	0.019222	0.057398	0.01282	0.0638

The Environmental Impact variable loses statistical significance altogether. An adjusted R^2 of .276 is respectable for cross-section data but slightly less than the first regression. The coefficients for ROA is significant at the 95% level (slight decline) the beta gains heightened significance at the 99% level. 1/(P/E) is positively and strongly related to volatility (beta); that is, as the volatility of a stock is increased, the price will weaken as investors currently seek safety in the post great recession environment.

If we regress P/E, rather than its inverse, the adjusted R^2 worsens to .175. The coefficients for ROA remains practically the same significance at the 95% level, the beta maintains heightened significance at the 99% level.

SUMMARY OUTPUT P/E

Regression Statistics	
Multiple R	0.476448
R Square	0.227003
Adjusted R Square	0.175469
Standard Error	7.120126
Observations	49

ANOVA

	df	SS	MS	F	Significance F
Regression	3	669.9472	223.3157	4.40498	0.00844
Residual	45	2281.329	50.6962		
Total	48	2951.276			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	30.13876	8.244918	3.655434	0.000669	13.53264	46.74487	7.963348	52.31416
ROA	-41.2526	15.44261	-2.67135	0.010479	-72.3557	-10.1496	-82.7868	0.281575
Envtl. Impact	-0.01875	0.115529	-0.16226	0.871825	-0.25143	0.213942	-0.32947	0.29198
Beta	-8.05516	2.673458	-3.01301	0.004236	-13.4398	-2.67053	-15.2456	-0.86466

Again the Environmental Impact variable loses statistical significance altogether. The constant is large and significant at 99% (the only big change). P/E is negatively related to volatility (beta); that is, as the volatility of a stock is increased, the price will weaken as investors seek safety. As expected this regression is very similar to the second, with the only change being the importance of the constant- not an explanatory variable.

CONCLUSION

The importance of minimizing environmental impact is confirmed for the health sector. Our 49 firms are all top ranked for financial performance and then assessed by Trucost on their environmental record. Trucost specializes in quantitative measures of environmental performance; their Environmental Impact Score is based on over 700 metrics including green house gas emissions, water use, and solid waste disposal. *When these health care firms rank high in these practices, their earnings per share are positively impacted by a 10% increase. The environmental bottom line improves the financial bottom line.*

We then introduced stock prices, as these capture expectations of future returns and future stock price movements. If being a good steward of the environment reflects enlightened leadership, then financial markets should find these stocks attractive and we would expect a positive impact on prices, driving up both the numerator and denominator of the EPS/P variable. We find no correlation. Similarly, a forward looking firm, positioned for more stringent environmental regulation, even prior to implementation, would be favorably impacted but there is no evidence of this. *We conclude that the financial impact is concurrent to the policy implementation with no expectations of future benefits factored into stock prices.* The heightened significance of beta supports the conclusion; many factors affect stock prices and environmental stewardship is not a predictor of future success while it is for current earnings.

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