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DOES COMPANY GREEN SCORE AFFECT STOCK PRICE?

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ABSTRACT

Do investors reward green companies by paying a higher than the equilibrium price indicated by the capital-asset pricing models? Or do they penalize green companies by paying a less than the equilibrium price because going green and keeping green is costly and reduces company profits? In this study, we seek an answer to these questions by using the green scores published by Newsweek magazine for the S&P 500 companies in 2012. We use the parameters of the Fama-French three-factor capital-asset-pricing model as control variables in multivariate linear regressions to assess the impact of company green score on stock price. We use the event-study methodology to test our hypothesis with one-week, four-week, and ten-week event windows after the publication of the company green scores by Newsweek. Our findings indicate that a company's green score is not priced by the market and that the variation between companies in terms of their green scores cannot explain the variation between their stock returns.

JEL: D21, G12, G38, H20, M14

KEYWORDS: Green Score, Environmental Impact, Stock Price, Multivariate Linear Regression Analysis, Capital Asset Pricing Model, Fama and French's Three-Factor Asset-Pricing Model

INTRODUCTION

Sustainability has become an important topic among companies worldwide as they seek to both incorporate environmental and social impacts into their decision making framework and disclose the results of their efforts to stakeholders. These factors add to traditional economic considerations and now make up what some refer to as triple bottom line reporting. The 2012 Governance Accountability Institute Report indicates 53% of the Standard and Poor's 500 produced sustainability reports discussing in depth company efforts toward social, environmental, and economic developments in corporate performance. This percentage reflects a sharp increase from the previous year and reflects growing efforts to be both green and economically productive. An examination of these reports includes a variety of metrics used to show both how they measure sustainability and the goals and improvements in them over time. The inclusion of sustainability assurance reports, while less standardized and regulated than those required for financial reporting, shows an increasing effort to reflect the reliability of social and environmental data (Brockett and Rezaee, 2012).

The ability of analysts and other users of these reports to incorporate the relevant data into their decision making has been a question for some time. While the literature has dealt with sustainability from multiple perspectives such as corporate strategy and the impact of sustainability on financial performance, a growing body of literature now addresses the impact of sustainability on stock prices. The availability of sustainability rankings by *Newsweek* and others helps provide those interested in sustainability an additional capability of incorporating sustainability efforts and accomplishments in investment decisions.

This paper is organized as follows. In the following section, we present our review of previous literature on sustainability. In the next section, we discuss our data and methodology. In the section titled "Results," we present our empirical findings. Our conclusions are presented in the last section of the paper.

LITERATURE REVIEW

Pressures to address environmental concerns are of increasing importance to companies throughout the world. Amber and Lanoie (2008) address the many ways firms can address these potential issues in terms of related strategies to improve operating performance. Hopkins (2009) discusses the implications of sustainable practices to management, and Dixon-Fowler et al (2013) discuss factors such as reactive versus proactive environmental strategies and large versus small firms to issues addressed by Amber and Lanoie (2008). They find that going green has its benefits but that proactive environmental strategies do not appear to improve profitability. Their results also suggest small firms benefit from environmental performance at least as much as large firms. While the literature has at times provided support for those favoring more sustainable efforts (McPeak and Tooley, 2008), some reveal just the opposite (McPeak et al., 2010). Blazovich et al (2013) studied green firms utilizing *Newsweek* rankings and the relationship of green scores in financial performance. They found that a high green ranking was not significantly related to firm financial performance while noting that being green does not appear to negatively impact firm profitability. They also found mixed results regarding green scores and risk with "at best, being green is associated with lower risk, and at worse, being green does not negatively impact firm risk." Meric et al. (2012) studied the impact of 2010 *Newsweek* green scores of US companies and found company green scores and stock prices are negatively related. Their findings based upon a market model suggest that market incentives may be needed to encourage firms to embrace going and staying green.

The growing emphasis of companies to disclose their sustainable efforts through sustainability reports, the use of rankings such as those provided by *Newsweek*, sustainability indexes and broader based reporting, and the worldwide movement for improved standards of sustainability reporting including integrated reporting, show interest in sustainability. With more and more companies providing sustainability reports, the Global Reporting Initiative in its fourth iteration, *Newsweek's* continued coverage of sustainability rankings, and more companies providing full integrated reports that merge traditional financial reports with those involving environmental and social endeavors (triple bottom line reporting), the opportunity for better decision making involving sustainability data has never been greater. Brockett and Rezaee (2012) refer to an Ernst and Young/Green Biz Forum (2012) joint survey of about 270 respondents at leading companies reporting trends of increased sustainability reporting and an increase in the CFO's role in sustainability as well as more active engagement by employees as stakeholders in sustainable efforts. The survey suggests the growing use of outside ratings and rankings, and the importance of third-party assurance on sustainability information. The failure of that survey to include the *Newsweek* Green Rankings among its choices and the frequent write-in by respondents to recognize those rankings makes our focused study of the *Newsweek* rankings especially meaningful.

Research involving sustainability reporting shows some concern for uniformity and conformity. Sherman and DiGuilio (2010) studied the disclosures in sustainability reports and whether GRI (G3) guidelines helped improve reporting. While reporting level did not seem to increase, the number of core performance indicators rose. They noted the lack of objectivity especially in social indicators and the higher proportion of pharmaceutical companies opting for external verification of their sustainability reports. Guidry and Patten (2010) studied the market reaction to standalone sustainability reports including the quality of the reports. They found no significant reaction to the announcement of a first-time issuance of a report. In terms of quality they found that only high quality reports added value with lower quality ones decreasing value. *Newsweek* rankings and their ability to both acquire a full range of sustainability data and process it for users, makes it an appealing data source for those trying to incorporate sustainability in stock

selection. The following discussion explains the methodology utilized by *Newsweek* and why it lends itself to the type of regression analysis used in this study.

DATA AND METHODOLOGY

Newsweek ranks the 500 largest US publicly traded companies in terms of their green scores. This study utilizes their 2012 rankings. Company size is evaluated according to revenue, market capitalization, and number of employees. The green score is derived from three component scores: Environmental Impact Score (EIS), Environmental Management Score (EMS), and the Disclosure Score (DS), weighted at 45 percent, 45 percent, and 10 percent, respectively. All scores are out of a possible 100. The EIS data is compiled by Trucost. It is designed to provide "a comprehensive, quantitative, and standardized measurement of the overall environment of a company's global operations." Based on more than 700 metrics including greenhouse gases, solid-waste disposal, and other emissions that contribute to rain and smog, Trucost "uses publicly disclosed environmental data to evaluate company performance for each impact metric whenever possible, and uses a proprietary economic input-output model to calculate direct-company and supply chain impacts in cases where data is unavailable." (see http://www.newsweek.com/newsweek-green-rankings-2012-full-methodology.html).

EMS data is based on the analysis of company data tracked by Sustainalytics' Global Platform. It seeks to assess how a company manages its environmental performance through policies, programs, targets, and certifications. This assessment includes a focus on company operations, contractors and suppliers as well as products and services. Core indicators are supplemented by more than 40 sector-specific indicators addressing issues such as water use and hazardous-waste reduction. The company's research process includes an examination of both broad based databases and company documents along with stakeholder communications. All profiles are peer reviewed and verified. (see http://www.newsweek.com/newsweek-green-rankings-2012-full-methodology.html). The Disclosure scores (DS) used by *Newsweek* assess a company's environmental transparency. Data used by Trucost reflects "the proportion of environmental impacts a company is disclosing out of those relevant to its business operations," while that provided by Sustainalytics assesses the "breadth and quality of company environmental reporting, as determined by the level of involvement in key transparency initiatives." (see http://www.newsweek.com/newsweek-green-rankings-2012-full-methodology.html).

The Most Green and the Least Green U.S. Companies

Twenty companies with the highest and lowest green scores in *Newsweek's* 2012 ranking of 500 of the largest publicly traded U.S. companies are presented in Table 1. The Pearson correlation coefficients between *EIS* (Environmental Impact Score), *DS* (Disclosure Score), *EMS* (Environmental Management Score), and *TGS* (Total Green Score) are presented in Table 2. The figures in Table 2 indicate that *TGS* is most closely correlated with *EMS* and least closely correlated with *EIS*. *EIS* is negatively correlated with the other green measures *DS* and *EMS*. The green measures *DS* and *EMS* are highly positively correlated. To study the effect of company green scores on stock returns, we use the following four multivariate linear regression models for three different event windows. Since the three different green measures and the total green score are closely correlated, we use them as an explanatory variable in four different regression models to avoid multicollinearity. In Models 1, 2, and 3, we study the effect of the three green measures on stock returns in three different event windows. In Model 4, we study the effect of the total company green score on stock returns in the same three event windows.

Table 1: 2012 Newsweek Green Rankings of 500 Largest Companies: 20 Companies with Highest and Lowest Green Scores

Rank	Company	Industry	Green Score
20 Highest Rated Companies			
1	IBM	Technology	82.9
2	Hewlett-Packard	Technology	78.5
3	Sprint-Nextel	Technology	77.5
4	Dell	Technology	77.1
5	CA Technologies	Technology	77.1
6	Nvidia	Technology	76.3
7	Intel	Technology	75.2
8	Accenture	Info Tech Services	74.7
9	Office Depot	Retailing	74.4
10	Staples	Retailing	74.4
11	EMC	Technology	73.6
12	Microsoft	Info Technology	73.5
13	Cognizant Tech	Info Technology	73.1
14	Hartford Financial	Financial	72.8
15	McGraw-Hill Media	Publishing	72.8
16	Manpower	Prof Services	72.8
17	Citigroup	Financial	72.7
18	Baxter	Healthcare	72.6
19	Cisco Systems	Technology	72.1
20	Motorola Solutions	Technology	71.8
20 Lowest Rated Companies			
481	Edison Int.	Utilities	34.2
482	Bunge	Food and Beverage	33.7
483	Mead Johnson Nutrition	Food and Beverage	33.6
484	PPL	Utilities	33.5
485	Ameren	Utilities	32.8
486	AES	Utilities	32.3
487	Allegheny Tech	Materials	31.9
488	Ameriprise Financial	Financial	30.9
489	Ralcorp Holdings	Food and Beverage	29.8
490	Tyson Foods	Food and Beverage	29.7
491	First Energy	Utilities	29.5
492	Archer-Daniels Midland	Food and Beverage	27.5
493	Peabody Energy	Energy	27.4
494	CONSOL Energy	Energy	26.3
495	Invesco	Financial	25.9
496	Monsanto	Materials	25.3
497	T.Rowe Price	Financial	25.0
498	CF Indust Holdings	Materials	24.3
499	Alpha Nat Resources	Energy	23.5
500	BlackRock	Financial	21.4

This table lists the top 20 companies with the highest green scores and the bottom 20 companies with the lowest green scores in the Newsweek list.

Table 2: Correlation Coefficients

	EIS	DS	EMS	TGS
EIS		-0.417	-0.109	0.612
DS	-0.417		0.566	0.303
EMS	-0.109	0.566		0.689
TGS	0.612	0.303	0.689	

This table shows the Pearson correlation coefficients between the green measures in the research sample. All correlation coefficients are statistically significant at the 1-percent level in the two-tailed tests. EIS = Environmental Impact Score DS = Disclosure Score EMS = Environmental Management Score TGS = Total Green Score

In the traditional capital-asset-pricing model (CAPM), beta is the main determinant of stock returns. Fama and French (1993, 1994) propose a three-factor capital-asset-pricing model in which, in addition to beta (β), firm size (*SZ*) and market-value-to-book-value ratio (*MB*) are also market risk measures and determinants of stock returns. Therefore, in our regressions we use these three determinants of stock returns in the Fama-French capital-asset-pricing model to control for the market risk.

1-Week Event Window:

Model 1:
$$1wRT_i = a_0 + a_1\beta_i + a_2SZ_i + a_3MB_i + a_4EIS_i + e_i \tag{1}$$

Model 2:
$$1wRT_i = b_0 + b_1\beta_i + b_2SZ_i + b_3MB_i + b_4DS_i + f_i \tag{2}$$

Model 3:
$$1wRT_i = c_0 + c_1\beta_i + c_2SZ_i + c_3MB_i + c_4EMS_i + g_i \tag{3}$$

Model 4:
$$1wRT_i = d_0 + d_1\beta_i + d_2SZ_i + d_3MB_i + d_4TGS_i + h_i \tag{4}$$

4-Weeeks Event Window:

Model 1:
$$4wRT_i = a_0 + a_1\beta_i + a_2SZ_i + a_3MB_i + a_4EIS_i + e_i \tag{5}$$

Model 2:
$$4wRT_i = b_0 + b_1\beta_i + b_2SZ_i + b_3MB_i + b_4DS_i + f_i \tag{6}$$

Model 3:
$$4wRT_i = c_0 + c_1\beta_i + c_2SZ_i + c_3MB_i + c_4EMS_i + g_i \tag{7}$$

Model 4:
$$4wRT_i = d_0 + d_1\beta_i + d_2SZ_i + d_3MB_i + d_4TGS_i + h_i \tag{8}$$

10-Weeeks Event Window:

Model 1:
$$10wRT_i = a_0 + a_1\beta_i + a_2SZ_i + a_3MB_i + a_4EIS_i + e_i \tag{9}$$

Model 2:
$$10wRT_i = b_0 + b_1\beta_i + b_2SZ_i + b_3MB_i + b_4DS_i + f_i \tag{10}$$

Model 3:
$$10wRT_i = c_0 + c_1\beta_i + c_2SZ_i + c_3MB_i + c_4EMS_i + g_i \tag{11}$$

Model 4:
$$10wRT_i = d_0 + d_1\beta_i + d_2SZ_i + d_3MB_i + d_4TGS_i + h_i \tag{12}$$

Where $i = 1, 2, \ldots, 460$ are the companies in the research sample that met full data requirements. $1wRT_i$ are the stock returns for the one-week event window (10/19/2012-10/26/2012). $4wRT_i$ are the stock returns for the four-week event window (10/19/2012-11/16/2012). $10wRT_i$ are the stock returns for the ten-week event window (10/19/2012-12/31/2012). $a_1, a_2, a_3,$ and a_4 are constants (intercept terms) in the regressions. e_i, f_i, g_i and h_i are the error terms in the regressions. β_i (beta), SZ_i (size), MB_i (market-to-book value) are the control variables in the regressions from the Fama-French capital-asset-pricing model. (see: Meric and Meric, 2011 and Wang et al., 2009 and 2011). $EIS_i, DS_i, EMS_i,$ and TGS_i are the green measures used as explanatory variables in the regressions.

RESULTS

The regression results with Equations 1 through 12 are presented in Table 3. All twelve regressions in the three event windows are statistically significant.

Table 3: Regression Results

	Model 1	Model 2	Model 3	Model 4
	One-Week Event Window			
Intercept	0.000	0.040	0.000	0.000
Beta (β)	-0.133***	-0.136***	-0.137***	-0.134***
Size (*SZ*)	-0.066	-0.071	-0.069	-0.061
Market-to-Book Ratio (*MB*)	-0.029	-0.027	-0.025	-0.029
EIS	-0.038			
DS		0.012		
EMS			0.009	
TGS				-0.024
Adjusted ^{R2}	0.026	0.025	0.025	0.026
F Value	3.087**	2.930**	2.930**	2.980**
	Four-Week Event Window			
Intercept	0.000	0.000	0.000	0.000
Beta (β)	-0.005	-0.000	0.000	-0.005
Size (*SZ*)	-0.116***	-0.101**	-0.119***	-0.127***
Market-to-Book Ratio (*MB*)	-0.249***	-0.251***	-0.251***	-0.247***
EIS	0.060			
DS		-0.044		
EMS			0.017	
TGS				0.048
Adjusted ^{R2}	0.075	0.082	0.080	0.082
F Value	10.361***	10.120***	9.920***	10.160***
	Ten-Week Event Window			
Intercept	0.000	0.000	0.000	0.000
Beta (β)	0.145***	0.146***	-0.141***	0.139***
Size (*SZ*)	-0.102**	-0.111**	-0.116**	-0.114**
Market-to-Book (*MB*)	-0.118***	-0.120***	-0.111**	-0.112**
EIS	0.004			
DS		0.030		
EMS			0.053	
TGS				0.043
Adjusted ^{R2}	0.031	0.040	0.042	0.041
F Value	4.618***	4.720***	4.930***	4.830***

*This table presents the regression results for equations 1 through 12 (regressions with the four model equations for each of the three event windows). *** and ** indicate that the regression coefficient of the variable is significant at the 1-percent and 5-percent levels, respectively.*

None of the green measures is significant in the regressions. This result indicates that investors did not respond to the publication of the green scores and that green score is not a determinant of stock returns. Some investors may not be aware of the *Newsweek* magazine green score publication. Some investors who may be aware of the publication may favor green companies. However, there may be some investors who may avoid investing in green companies because going green and keeping green is costly and can reduce company profitability. These two effects may tend to cancel one another. Beta is statistically significant for the one-week and ten-week event windows. However, it is not significant for the four-week event window. The sign of the regression coefficient of the variable is positive for the ten-week event window as postulated by the Capital Asset Pricing Model (CAPM) (i.e., firms with a higher beta receive higher returns). It appears that a longer event window period provides a better test for the CAPM.

As in the case of the CAPM, it appears that a longer event window period also provides a better empirical test for the Fama-French three factor capital asset pricing theory. The size variable (*SZ*) is not significant for the one-week event window. However, the regression coefficient of the variable is statistically significant with a negative sign for the four-week and ten-week event windows. This result implies that, because they are riskier, investors require higher returns from smaller firms as postulated by the Fama-

French three factor capital asset pricing model. As in the case of the size variable, the market-value-book-value (*MB*) is not significant for the one-week event window. However, the regression coefficient of the variable is statistically significant with a negative sign for the four-week and ten-week event windows. This result implies that, because they may be under financial distress, investors require higher returns from firms with a lower *MB* ratio as postulated by the Fama-French three factor capital-asset pricing model.

CONCLUSIONS

This paper has examined the impact on stock prices of green score information provided by *Newsweek's* 2012 Sustainability Rankings. Data for the 500 largest U.S. companies published in October, 2012 were considered based upon *Newsweek* disclosures for three different sustainability measures and an overall green score. The Fama-French three factor capital asset pricing model was used to evaluate stock market performance around one, four, and ten weeks event windows. In the Fama-French three factor asset pricing model, beta, size, and market-to-book ratio serve as the determinants of stock returns. Four regression models with each of these variables and one for each of the green score variables: *EIS* (Environment Impact Score), *EMS* (Environmental Management Score), *DS* (Disclosure Score), and *TGS* (Total Green Score) were used. All twelve regressions for the three event windows are statistically significant. However, none of the green measures is significant for any of the three event windows. This result contradicts the findings of a previous study which found green measures and stock prices to be significantly negatively correlated (see: Meric et al, 2012).

Beta is statistically significant for one and ten-week event windows but not for the four-week window. The positive sign of the regression coefficient in the ten-week window is consistent with the model's underpinnings that higher beta stocks have higher returns. Thus, the ten-week window, or longest of the three windows, is a better test for the CAPM. These results are also consistent with the Fama-French theoretical underpinnings since the sign of the size variable is not significant for the one-week window. This is in contrast to the four and ten-week event windows where a negative sign is statistically significant. This implies that because of higher risk, investors require higher returns for smaller firms. The market-value-to-book value (*MB*) regression coefficients indicate similar results, with only the four and ten-week windows being statistically significant with negative signs. The implication is that firms with a low MB ratio and possible higher financial distress require higher returns.

An important limitation of our study is that all investors may not be aware of *Newsweek's* sustainability rankings. Therefore, it may be difficult to capture the impact of the company green scores in this publication on stock prices with statistical tests. Our finding that none of the *Newsweek* sustainability measures is statistically significant may reflect that fact. Another limitation of our study is that *Newsweek's* sustainability rankings are published every year. These rankings might have had a significant impact on stock prices when they were first published but the effect may lessen gradually over time particularly in the case of companies ranked as green in the list every year. One last limitation of our study is that it is difficult to determine the optimal length of the event window. In some event studies the event window period can be relatively precise such as dividend or merger announcements, a stock market crash, etc. In our study, it is difficult to determine with any degree of precision how long it would take investors to be informed about *Newsweek's* sustainability rankings.

It is interesting to try to determine if company green scores have any impact on security prices (i.e., whether the market awards companies that go green with higher valuations or penalizes them with lower valuations because going green is costly and therefore can negatively affect company profitability). This study is one of the preliminary studies on this subject and more studies should be expected in the future. One possibility for future research is to use principal components analysis in an arbitrage pricing theory type model to assess the impact of company greenness on stock prices. Such a model would enable the

researcher to include all company specific variables into the model and perhaps be able to name one of the principal component factors as the green factor and test its statistical significance with factor scores. As a study topic, the effect of company greenness on investor decisions is quite suitable for a survey-type analysis. Therefore, future studies may attempt to further determine investors' attitudes toward green companies with survey questionnaires distributed to investors and others involved with the financial community. Our study focuses on the United States. Future research may also study the effect of company greenness on stock prices in European countries and in emerging markets for comparison.

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