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How does the Stock Market Value the Renewable Energy Sector: A Public Announcement Analysis and Test of the Efficient Market Hypothesis

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Introduction

As one of the fastest growing sectors in the world economy, clean energy is at the forefront in both financial and environmental importance. This stemming from the growing concerns of energy sustainability, continual climate change, and technological advancements. As knowledge continues to rise on the effects of pollution and the necessity for an alternative fuel in the near future, interest and investment in clean energy will continue to rise. With the rise in interest and investment into the sector, so too does the size and value of renewable energy firms. This paper focuses on the value of these clean energy firms and how the market sees them, reacts to their decision making, and the factors of the outside world that affect them.

How does the market value a stock or entity? This is a question that has been debated and theorized without limit. There are basic fundamentals that are seen on a balance sheet such as total assets, total debt, revenues, and the numbers and valuation metric continue to go on. For this reason there are countless analysts and researchers whose sole job is using high-level valuation techniques to calculate a the worth of a company. In the public market companies are comprised of shares of a stock. Each share is a percentage holding or ownership of the company. The stock market in which these stocks are bought and sold moves at an incredibly high rate. How the market acts and reacts is something that may never be known.

A central theory that is widely accepted, as a fundamental definition of how a company is valued in the stock market does not include high level analytics or metrics but rather is based on behavior of individuals. This is known as the 'Efficient Market Hypothesis' (Malkiel, 2003). The efficient market hypothesis states that stocks always trade at their true value as the value of a stock is reflected by all relevant and available information. When new information is released into the public, then the market reacts and re-evaluates the stock and prices it accordingly. It is because of this that it is believed that it is impossible to beat the market.

This paper will test this theory through the implementation of statistical analysis of certain valuation metrics but also through assessing the changes in the price of a stock after new information is released. The new information will come in the form of announcements made by the company of study. In much of the academic writings, there are three main schools of thought. The first is very similar to the efficient market hypothesis is that it states that upon the announcement of a new investment, for example, the market evaluates the project and decides if it is worth more, or less as a result of the new project (Tobin and Brainard, 1977). The next as identified by Wooldrige (1988), assumes that the market investors anticipate and pre-value future information and include this into the price of a stock. This comes from the belief that the management of the company accurately asses the net

present value and all future income prior to the announcement of the new project and that upon the announcement, the value already encapsulates the fair market value. Lastly is an almost opposite approach to the market reaction to new information. Upon the announcement of a new project, the management of the company has forfeited their belief in the proper evaluation of the market value of their firm due to their management. Most simply, the 'Myopic Stock Market Approach' states that an announcement of a new investment will in fact have a negative affect on the share price (Burton et al, 1999).

To properly test these hypotheses, it is essential to capture all potentially valuable information. Central to the topic of clean energy companies is the discussion of oil prices and their consequential effects on the industry as they are potentially (in the near future) substitutes as the energy source for the world. Estimates in 2004 predicted that the production would peak in between 2016 and 2040 (Appenzeller, 2004). Today, in 2015, the oil supply reserves are at recent highs as production has in fact increased in recent years. By assessing the pricing of crude oil over time in relation to the performance of these renewable energy firms, there should be an intrinsic value to the information. More specifically, the world cannot react and turn the technological focus and investments to renewables as oil prices skyrocket but instead should be proactive. The goal of this paper is to ask the question: how does the market value the renewable energy sector? This will be done through testing the efficient market hypothesis in the context of new announcements and the markets consequential reaction. Coupled with the assessment of the sectors greatest enemy and closest substitute, oil, and its pricing influences on the forward looking stock markets evaluation of clean energy.

Literature Review

As the renewable energy sector has been in the forefront of the economic and environmental world for decades, there has been extensive research done on renewable energy in the market. Specifically, much of which is focused on the questions asked above. Catherine Bolatoff and Carol Marie Boyer (2009) wrote a paper exploring the performance of "Environmental Stocks" as they call them. Through the assessment of 310 stocks under various categories they explore the indicator variables that most significantly have a positive or negative effect in the value of a stock in the market. Moreover, they are able to find through simple regressions, that solar and biofuels are the most developed sectors in the industry, compared to geothermal which they identify as the least developed sector. Continually, solar is identified as the most profitable of the various clean energy sectors over their time period of study.

In more important terms as they relate to the focus of this paper, they state that cost of capital, EPS, and capital expenditures positively affect stock performance at a significant level. However dividend yield, short-term liquidity

(i.e. cash on hand), and research and development negatively affect stock performance. In conclusion they state that the performance of the renewable energy industry has in fact underperformed the S&P 500 over the time of their study (2004-2009).

The variables of focus in this paper are aimed to similarly test performance metrics and the like. Furthermore, a paper by Burton et al. titled, "The Stock Market Reaction to Investment Announcements: The Case of Individual Capital Expenditure Projects" studies many of the same core fundamentals as the paper by Bolatoff and Boyer. However, this paper focuses on the market reaction to new announcements of capital expenditure projects. They start by compiling over a thousand announcements of all types of stocks in the publically traded markets and test their statistical significance to their effect on the stock price at the time of the announcement. As the stock market is a linear and continually moving marketplace, it is importance to capture the true effect of the announcement. Calculating what is known as an 'Abnormal Return' as it is simply a return on a stock that is different that it would otherwise be (Burton et al, 1999). They calculate the abnormal return by subtracting the entire market portfolio return on the day of the announcement from the return of the company making the announcement. They find that joint venture announcements have a positively significant affect on the performance of a stock. Next, they perform a cross-sectional analysis on the effects of the announcement on a stocks performance by adding certain fundamental firm metrics into a regression. Their model looked as follows:

$$\mathrm{AR}_i = \beta_0 + \beta_1 \mathrm{PFDUM}_i + \beta_2 \mathrm{ANNSIZE}_i + \beta_3 \mathrm{COSIZE}_i + \beta_4 \mathrm{MB}_i + e_i$$

in which AR refers to the abnormal return over a given period, PFDUM acts as a dummy variable representing if net prior funding is greater than the size of the investment or capital expenditure being announced. ANNSIZE measures the size of the announcement itself, COSIZE is a ranking of the size of the company calculated by taking the average ranking in the portfolio of annual sales, market value, and total assets. Lastly, MB represents the market-to-book ratio, which is a ratio of the market price of the stock divided by the book value of the company. If the ratio is greater than one then the stock is overvalued, as the value of the company is hypothetically equal to the book value.

Woolrige and Snow: according to the traditional valuation theory, the market value of the firm is the sum of (a) the discounted value of future cash flows expected to be generated from assets in place and (b) the net present value of expected cash flows from investment opportunities that are expected to eb available to and undertaken by the firm in the future.

Through their results of this cross-sectional analysis they are able to conclude that the size of the announcement is the only statistically significant variable for what they call "immediate cash gathering" projects. However, they are not able to state statistical significance for any other variables for any other type

announcements outside of the positively statistically significant affect of a join venture announcement regardless of the values of the other variables.

In a slightly dated paper written by Woolridge and Snow, titled "Stock Market Reactions to Strategic Investment Decisions" (1990), they too explore the market reaction to investment decisions and announcements. In discussion of the theoretical background they state:

> "In a perfectly competitive factor and product markets, strategic investment projects with positive (or negative) net present values are nonexistent. If a strategic investment is perceived to have a positive net present value, then it instantly attracts new entrants to the industry. This in turn increases factor prices and capacity and drives product prices down" (Woolridge and Snow, 1990).

The idea behind how, in fact, new strategic investment decisions are capable of generating a positive net return is based on the imperfections in the markets that allow a company to gain a competitive advantage over competitors (Woolridge and Snow, 1990). Examples of this are decreasing production costs, increasing variability of products offered. Lastly, they argue, that barriers to entry are in fact created by these competitive advantages, which cause for an "imperfectly competitive" industry that allows for positive net present value strategic investment decisions.

In the paper, similar to that by Burton et al, the abnormal returns of a company is evaluated within a specified time frame of an announcement to assess the lag of the market reaction. However, different from that of Burton, Woolridge and Snow use the size and duration of the project as explanatory variables rather than fundamental evaluation metrics of the firm. The size of the investment is taken as a percentage of total assets to give a weight to the true size of the capital expenditure relative to the company size itself. The results show that abnormal returns are had for both R&D investment announcements as well as Joint Venture announcements, similar to that of Burton et al. They find that for both small and large investment announcements, there is a statistically significant and positive return. Furthermore, the same is true for both short and long term investments. These results support the hypothesis of the efficient market hypothesis in that the market reacts to new information being made available and re-evaluates the security price.

As management continues to make strategic decisions it is continually imperative that they assess all factors. More specifically to renewable energy firms it is important to know when may be a poor time in the market to announce a new capital expenditure investment announcement. This is what is called market timing which is a theory discussed at length by many academics and economists. It most simply is the attempt to predict future directions or movements of the market and seeking an arbitrage opportunity by timing your decision accordingly (Huang,

2004). This theory typically is in reference to investors in the market but is certainly applicable to management in their decisions.

A factor of utmost importance to many clean energy management teams, is the future pricing or movements of oil. This being due to the intuitive belief that renewable energy firms stock pricing moves with the price of oil: price of oil increase and thus, so does the value of clean energy this is a topic studied frequently throughout academia. A study done by Surender Kumar, Shunsuke Managi, and Akimi Matsuda, titled "Stock Prices of Clean Energy Firms, Oil and Carbon Markets: A Vector Autoregressive Analysis" studies such correlations (2010). In the study they perform a 5-week VAR analysis in which the movements of each variable is tracked over time with a specific lag period given. The important factor here is to assume an accurate lag period or else all data and results are invalid or misleading. Included in their model is an interest rate variable. Prior research has shown that there is a significant relationship between interest rates and stock market pricing (Sadorsky, 1999, 2001- got from source 6 pg. 218). This is also something that is simply well known in the economic and financial world. For their study, they use the yield on a 3-Month US Treasury bill. Their results show that previous movements in oil prices as well as the stock prices of high technology firms and interest rates explain the relative movement of the clean energy indices in which they studied.

The relationship between oil prices and increasing alternative energy stock prices is due to the substitution of the two. Furthermore, as studied further in other papers, high technology firm stock prices are related to alternative energy stock pricing (Sadorsky, 2011). This being, in part, due to the direct correlation between the emerging technologies of alternative energies and the importance of high technological advancement. This is intuitive, as alternative energy prices are, still, relatively high.

Methodology

Data and sample

To effectively measure the market reaction to a new announcement, a sample of publically traded company announcements were compiled. Starting with a list of 53 firms in the renewable energy sector; focused in solar, wind, hydro, geothermal, and nuclear energy capacities. The announcement data was compiled by going to each company's "press release" page, upon which data such as the date of the announcement, the type of the announcement, and any numerical valuation of the project or strategic decision was implemented into the database. The types of announcement variables compiled are as follows: project, contracts, orders, joint ventures, acquisition, stock offering, debt offering, and management announcement. The compiled data cumulated to 1067 days of announcements. The time period selected for this research starts January 4th of 2010 (first full day of

open markets of the year) and ends December 31st of 2014, giving a five-year window of study. Throughout this period there is an important portion of the economic business cycle as the US economy is still in what was considered to be a recession in 2010, and recovers as the economy continued to slowly grow back to more current and higher levels of growth, employment, and consumption. Furthermore, this is an interesting period for the renewable energy sector more specifically as there is a similar cycle of investment levels, up and down, throughout the period of study. However, this study is not focused on measuring the variance of the market reaction to announcements based on the state of the economy, rather of non-differentiated results throughout a portion of the economic cycle. Statistical significance tests are run on the data during each year to test for differences. Nonetheless, there may in fact be something to be said of differing reaction magnitudes based on the condition of the economy. To capture a standard metric signifying the state of the US economy, the yield on 3-Month US Treasury Bills is measured over time. This data was collected from the St. Louis Board of the Federal Reserve webpage at a monthly frequency.

As a portion of the study is testing the timeliness of the market reaction to investment announcements, a lag is taken into account for what is measured as the abnormal return period. More specifically, the day before and after the announcement are also included into the measurement of abnormal returns.

Furthermore, this study is to examine some of the more conventional indicators of corporate growth potential and whether or not the market takes these indicators into account when making valuation decisions on a particular security and their respective announcement.

The key, conventional indicator data was collected from a software program run by the S&P Capital IQ group from McGraw Hill Financial, "Research Insight." The indicators acting as explanatory variables in this study that were tested and considered are value, growth, and volatility based. Similar to Burton et al, company size is based on a ranking system in which the average ranking of total assets, market value, and total sales within the portfolio of companies in the study. This is to account for the markets potential reaction to a company announcement and the volatility of the response due to either a small company with a larger upside versus an established and developed company potentially just maintaining the status quo by keeping cash flow coming in through the projects. This is similar to dividend yield in many regards, although it is considered in the model, as larger companies have higher amounts of cash on hand to promise dividend payouts to their shareholders. Conversely, companies who do not pay out dividends on their shares are typically, but not always, more developing startup companies as they need to keep the cash for reinvestments and the like (Boulatoff and Boyer, 2009).

As a measurement of growth and stock performance, earnings per share (EPS) are included over an averaged twelve-month period. What this means most

simply is that with a high EPS, the firm is performing well and thus, is shown in their stock price. Continually, capital expenditures to total assets is a calculated variable in the model which measures to what degree the firm is spending their money on investment projects. This is to encapsulate the firms desire to grow and expand, which may in fact be a telling sign to many investors in the market. Again, each of these variables and their respective data were collected from the research insight program, through a database known as Compustat.

Oil prices were collected from the St. Louis Fed website in which it measures daily crude oil prices at the close of the market. The measurement of the effect of the changing crude oil prices is captured by the log of the prices, which means the percent change in the price of the oil from the day before. Furthermore, the daily close stock price data was collected online through Yahoo Finance. Daily prices were collected over the period and similar to capturing the change in oil prices, daily prices are logged to show the percentage change from day to day.

Method of Analysis and Results

Three day abnormal returns are estimated for all 1,065 announcements in the final dataset. The return on a stock is simply the percentage increase or decrease change in the stock price from one period to the next. Daily returns are calculated through a simple formula:

Daily Return = $\text{Ln}(\text{adj\_close}_t / \text{adj\_close}_{t-1})$

With this, the abnormal returns are measured and analyzed to assess market reactions to the different types of announcements. Abnormal returns are measured by many through the "conventional market model," Burton et al for example use:

$$\text{AR}_{it} = \text{R}_{it} - (\alpha_i + \beta_i \text{R}_{mt})$$

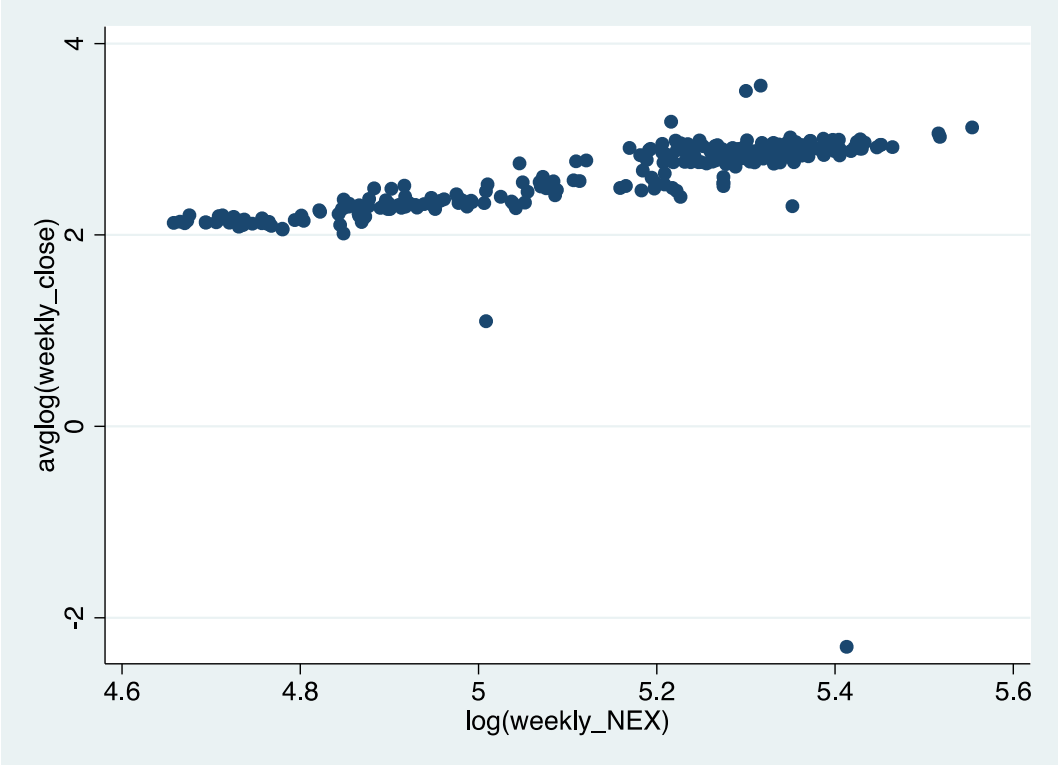
In which R_{it} is the return for company *i* on day *t*, while R_{mt} is the market portfolio return on day *t*, while **α**and**β**represent market parameters. The parameters represent varied risk, otherwise known as beta, in the market. It is important to note that for the measurement of abnormal returns there is evidence suggesting that the choice of the benchmark is not as important as the frequency of the stock pricing. Meaning daily stock prices are essential to the model, rather than weekly or monthly data (Strong, 1992).

For the purposes of this study, the abnormal returns are measured in a slightly different manner. As this is not a study of the entire market but rather the renewable energy market, a clean energy index is used as the basis for "standard" or "expected" return. Wilderhill Clean Energy Index (NEX) is the index used for this study and evaluated at adjusted daily closing prices. This index is chosen for the study as it has the largest portfolio of clean energy companies and one of the few true indices that tracks the clean energy market and does not act as a fund by seeking long-term investment strategies. Furthermore, the abnormal returns are

measured as a difference between each company *i's* daily return on day *t* on the market (clean energy index).

$AR_{it} = \log(Return_{it}) - \log(Return\_NEX_t)$

This is a much more simplistic model than many others as it does not include volatility measures but ideally this properly measures an effective abnormal return. With the assumption that this index does in fact effectively track the clean energy sector this calculation over the three-day pre and post-lag period should encapsulate the true abnormal return. A scatterplot of the daily natural log of returns for both the NEX index as well as the total portfolio studied in this paper shows the strong correlation between the two over time.



The abnormal returns around the announcement date need to be analyzed against fundamental valuation factors to truly test market reactions to these announcements, and how the market values renewables.

Through studying the effects of various announcements across different companies over time it is essential to have the proper model to assess the results. For this model, the data is set up as panel data, which allows for variables to be controlled for and vary across time for each individual entity (Torres-Reyna, 2007).

To assess the proper regressions to run, various tests are performed on the data and the model. Through this we can confirm the validity of the variation of the data as well as the proper regressions to run with the panel data. The two regressions

of choice are Fixed Effects and Random Effects. Fixed Effects models are best used when interested in looking into the effects of certain variables that may vary over time. Fixed Effects takes into account the variation of the variables for each entity, which in this case, are the different companies. By doing this, the model takes into account the variation and the effects that the differences in values may have on the dependent variable (Torres-Reyna, 2007). To test the assumptions of the fixed effects regression a Hausman Test is performed. This test tests the correlation between the error terms amongst different entities. Should there be a correlation, a random effects model is necessary.

The Random Effects regression assumes that the differences between companies is random and is does not have any sort of correlation with the dependent variable or the explanatory variables in the model (Torres-Reyna, 2007). Contrary to fixed effects, the random effects model assumes that the company error terms are not correlated with the independent variables.

After performing various tests such as the Hausman test, the Breusch-Pagan test of independence, tests for serial correlation and a test for heteroskedasticity. Through each of these tests, it is clear that the fixed effects model is the best predictor of market reaction to announcements.

First, a fixed effects model is run testing the abnormal returns seen on days of each kind of announcement. It is important to note that the types of announcement variables may be interchanged and both are "on" for the same days. For example, a joint venture project would count as both a joint venture announcement as well as a project announcement. Regressions are run on various combinations of common announcements that would in fact be predicted to cause an abnormal return on that day, assuming that the efficient market hypothesis is in fact true.

Of the different kinds of announcements, six showed to have some level of statistical significance at the minimum of the 5% level. Overall, all announcements prove to have a positively statistical significant influence on the abnormal return of a company at the 0.1% level. This however may need to be interpreted as simply that there is a statistical significance in the influence and not that sign of the effect. This being due to the differences in the sample size of the various announcements, for example, there are 798 days of acquisitions but only 51 for debt offering announcements.

	Abnormal Return
Announcement	0.0969*** (4.06)
Project	0.0917* (2.51)
Contract	-0.00733 (-0.12)
Order	0.0630 (1.36)
Order (Project==1)	0.0211 (0.38)
Joint Venture	0.169*** (3.49)
Joint Venture (Project==1)	0.204** (2.64)
Joint Venture (Acquisition==1)	0.349 (1.57)
Acquisition	0.240*** (4.03)
Acquisition (Acq_Close==0)	0.212** (2.81)
Sale	0.111 (1.34)
Sale (Sale_Ann==0)	0.126 (1.11)
Stock Offering	0.0770 (0.77)
Stock Offering (Stock_Ann==0)	0.0884 (0.51)
Stock Repurchase	0.253 (1.24)
Debt	-0.0945 (-0.53)
Management	0.00250 (0.04)
Appoint	0.0213 (0.28)
Management (Appoint==0)	-0.0857 (-0.52)

t statistics are in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

As expected we can see a positively significant coefficient for project announcements. This would be expected with the efficient market hypothesis, as investors are either seeing increased future revenue with announcements of new projects or the validation of managements' work with announcements of the completion of a previously announced project. Similar to Burton et al, Joint Venture announcements are statistically significant and in this study, they have among the largest magnitude in terms of the positive abnormal return seen. These along with acquisition announcements prove to have the largest influx of investments, and thus increase in pricing. Both types of announcements also would make intuitive sense in many ways from a fundamental financial valuation standpoint.

Joint Ventures are investments or agreements between at least two firms for some project or simply a symbiotic relationship. In essence, there is very little downside in a properly executed joint venture project or acquisition. The two companies can use the best of each of their own resources all while mitigating their own risk on the downside by not having a complete ownership over the entire deal. Furthermore. Simple acquisitions are almost always positive as they mean the influx of more capital, and hopefully, more revenues. A company would make such a purchase of another if they deem it fit to bring in additional revenues into their own portfolio and help in their own personal successes.

It is most important to note that these results in fact validate the efficient market hypothesis in that the stock market reacts to announcements and the influx of new information into the market. The statistical significant results on all announcements as well as the projects, joint ventures (general, projects, and acquisitions), and acquisitions prove the immediate market reaction. As mentioned prior, the joint venture announcement reaction is similar to the results in burton et al. However they are not able to conclude or prove any other statistically significant relationship between abnormal returns and other announcements. This may be due to the variation in the models, or may in fact show a difference in the market reaction and valuation in the renewable energy sector versus the entire market. To further assess the market valuation of the renewable energy sector, it is important to look at fundamental valuation metrics in the context of the announcement days.

	(1) announcement	(2) project	(3) contract	(4) order	(5) jointventure	(6) acquisition
PB	0.000319	-0.00000612	-0.00000598	-0.0138	0.000455	-0.00969
	(0.37)	(-0.54)	(-0.53)	(-0.32)	(0.36)	(-0.26)
ROE	0.000278	0.0000432	0.0000427	0.000472	0.000359	-0.000195
	(1.55)	(0.95)	(0.94)	(1.81)	(0.81)	(-0.17)
captoass	0.0851	0.299	0.259	-0.394	1.055	-0.0789
	(0.09)	(1.47)	(1.29)	(-0.24)	(0.45)	(-0.02)
lncrude_da~y	0.735	0.0755	0.0992	0.158	0.853	1.798
	(1.95)	(0.92)	(1.21)	(0.21)	(0.89)	(1.20)
moTbill	-0.323	-0.164	-0.162	-0.00946	-0.336	-1.062
	(-0.37)	(-0.84)	(-0.84)	(-0.01)	(-0.14)	(-0.33)
_cons	-3.177	-0.343	-0.444	-0.552	-3.651	-7.731
	(-1.82)	(-0.90)	(-1.17)	(-0.16)	(-0.82)	(-1.11)
N	2284	39378	39952	571	510	314

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

	(1) stock offering	(2) stock repurchase	(3) debt offering	(4) management	(5) appointment
PB	-0.262	0.0456	8.940	-0.625	-0.0413
	(-1.42)	(0.07)	(0.29)	(-0.34)	(-0.54)
ROE	-0.0111*	0.00444	-1.210	-0.0552	-0.0000648
	(-2.18)	(0.86)	(-0.12)	(-0.38)	(-0.13)
captoass	10.95	-7.227	73.33	-11.77	0.232
	(1.72)	(-1.24)	(0.26)	(-0.58)	(0.07)
lncrude_da~y	1.414	5.280	2.223	0.721	-0.539
	(0.65)	(0.94)	(0.04)	(0.10)	(-0.47)
moTbill	3.404	1.792	-85.70	-8.215	-1.146
	(0.75)	(0.22)	(-0.17)	(-0.40)	(-0.41)
_cons	-6.922	-23.51	-34.98	-1.431	2.588
	(-0.70)	(-0.93)	(-0.11)	(-0.04)	(0.49)
N	169	111	35	39	250

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

The abnormal returns on days of announcements were analyzed to assess the market and the factors that may influence the response. Five variables are analyzed: Price to Book ratio, return on equity, capital expenditures to assets, the daily percentage change in crude oil pricing, and the three month T-bill for that corresponding month. Each variable is included into a fixed effects model against abnormal returns and run on days of each kind of announcement.

These results show that these standard valuation metrics and macro economic factors have no influence on market reaction in fact. It is important to note the fact that the price of oil has no influence on the investor's reactions against what was previously hypothesized. However, there is a statistical significance in the return on equity in the context of stock offering announcements. This intuitively makes sense as an investor is going to want to know to what extent can I expect a return on this investment. Limitations to the model may be due to improper selection of variables and metrics, however these are rather standard in terms of the growth and the overall standing of a company. This does not take away from the efficient market hypothesis completely but rather may serve as a topic of further study. A further research question may be best served to be "what are the most influential fundamental values to the market reaction to announcements?"

These results are similar to many studies in which cannot find a significant relationship between fundamental valuation metrics and their influence on the market reaction. Most simply this may be because of the fact that many investors see a smaller company with large growth potential to be more valuable so they react much more extensively to an announcement than another more conservative investor. This in essence would explain the lack of telling statistics. A further limitation to this study may in fact be the lack of companies as 51 are studied. This sample size may not be extensive enough with a large enough variation amongst fundamentals to tell a true story.

Conclusion

This simple study may not be extensive enough to make any overarching cause and effect conclusions. However, the results give telling signs into how the market values renewable company strategic decisions. By finding statistically significant abnormal returns on periods of project, joint ventures, and acquisition announcement days we can infer the validity of the efficient market hypothesis. The limitations of this study are certainly not short and simple as sample size of companies and the measurement of the abnormal returns may have cause different than actual results. This does not mean to ignore the plain results that are seen. The extensive studies go into greater detail with a larger sample size to mitigate any biased errors. Within the portfolio of renewable energy companies' in this study, there is a definite conclusion of the efficient market hypothesis.

Most interestingly in this study is the lack of statistical significance of the fundamental valuation metrics and their influence on the abnormal returns on days of announcements. This is a topic that should be researched and studied further to gain a better grasp of how in fact the market values companies. However, these results may be the endpoint of these sorts of studies. As the market is a behemoth that may never be understood.

Works Cited

Appenzeller, T. (2004). The End of Cheap Oil, *National Geographic,* 205 (6) (2004), 82-109.

Boulatoff, C., & Boyer, C. (2009). Green Recovery: How Are Environmental Stocks Doing? *The Journal of Welath Management,* 9-20.

Burton, B., Lonie, A., & Power, D. (1999). The Stock Market Reaction to Investment Announcements: The Case of Capital Expenditure Projects. *Journal of Business Finance Accounting J Bus Fin & Acc,* 688-708.

Kumar, S., Managi, S., & Matsuda, A. (2011). Stock Prices of Clean Energy Firms, Oil and Carbon Markets: A Vector Autoregressive Analysis. *Energy Economics,* 215-226.

Malkiel, B. (2003). The Efficient Market Hypothesis and Its Critics. *Journal of Economic Perspectives,* 59-82.

Managi, S., & Okimoto, T. (2013). Does the Price of Oil Interact with Clean Energy Prices in the Stock Market? *Japan and the World Economy,* 1-9.

Sadorsky, P. Henriques, Irene. (2008). Oil Prices and the Stock Prices of Alternative Energy Companies, *Energy Economics,* 998-1010.

Sadorsky, P. (1999). Oil Price Shocks and Stock Market Activity, *Energy Economics.* 449-469.

Sadorsky, P. (2001). Risk Factors in Stock Returns of Canadian Oil and Gas Companies, *Energy Economics,* 17-28.

Strong, N. (1992). Modeling Abnormal Returns: A Review Article, *Journal of Business Finance & Accounting,* 533-553.

Torres-Reyna, O. (2007). Panel Data Analysis Fixed and Random Effects. *Data & Statistical Service,* 1-40. Retrieved April 7, 2015, from http://www.princeton.edu/~otorres/Panel101.pdf

Woolridge, R.J. (1988), `Competitive Decline and Corporate Restructurings: Is a Myopic Stock Market To Blame?', Journal of Applied Corporate Finance, Vol. 1, pp. 26-56.

Wooldridge, J., & Snow, C. (1990). Stock Market Reaction to Strategic Investment Decisions. Strat. Mgmt. J. *Strategic Management Journal,* 353-363.