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HONORS THESIS

Environmental, Social, and Governance Factors Within Investing: Impact on the Financial Performance of the Energy Sector

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ABSTRACT

An emerging social pressure of being environmentally and socially responsible has been an increasingly popular concept through the past decades. Socially responsible investing (SRI), or environmental, social, and governance (ESG) investing is an investment strategy which aims to flood publicly trading companies with capital who operate according to specific morals and standards. Studies has proven investors who factor ESG into their portfolio strategies often see greater return, as firms are able to create more long-term value. The purpose of this study is to analyze the effects of ESG activity and ratings on the financial performance of firms in the energy sector comparing renewable and nonrenewable energy companies. Using Timeseries ESG data of the first quarter of 2018 from Morgan Stanley Capital International (MSCI), four different portfolios were created using a sample of 78 energy companies. The portfolios were split by renewable and nonrenewable companies, and companies with lagging ESG scores. By calculating the holding period return and running the Capital Asset Pricing Model with each portfolio, the results showed the laggard ESG nonrenewable energy portfolio generated the best return, Covid-19 pandemic, and short period of observation all played roles into the performance.

INTRODUCTION

Every day, market analysts and investors look for any type of pattern which they can use to their advantage to make a profit through the stock market. Valuations are completed to predict future prices, ratios are analyzed, and investment strategies are adjusted. In the past few decades, a new factor has been added in the mix to once again adjust how investments are made. With a rising concern regarding environmental stability and overall corporate responsibility, the concept of environmental, social, and governance (ESG) factors has made it to Wall Street and beyond. Essentially, this is the idea of leading sustainable and responsible investment strategies (Dalal 2019). In turn, firms must model these ethical standards to be viewed in a positive light by investors. This includes leading environmentally friendly business practices, adhering to social standards by treating their employees and the communities around them well, and following governmental regulations as they are set out (Auer & Schumacher, 2015). The incorporation of ESG into investment strategies varies by the firm/investor. Some put it on the forefront, while others find it less important in the big picture. To better understand the extent to which ESG factors affect portfolio performance, this study focused on Morgan Stanley Capital International ESG scores to determine portfolio construction with a focus in the energy sector. While it cannot be a sole predictor of investment returns, my research shows both its value and variability from 2018-2021.

Defining Environmental, Social, and Governance

The idea of ESG was first mentioned in 2006 in the United Nations Principles for Responsible Investment report, discussing how it must be incorporated in financial evaluations of firms to influence sustainable investments (Atkins 2020). Since then the research surrounding it within the finance, accounting, and management world has skyrocketed. Essentially, to be a socially responsible investor you must be aware of the firms ESG activity and have your own measurement of quality. To address this issue, there has been an emergence of rating companies which all use their own empirical analysis strategies to determine a final ESG score or rating. Popular rating firms include Morgan Stanley Capital International (MSCI), Sustainalytics, S&P Global, Vigeo-Eiris, or Thomson Reuters Refinitiv ESG (Berg 2021). While the approach to ratings will vary by firm, the areas looked at remain the same. Environmental scores prioritize environmental awareness, proactivity in recycling, waste production, environmental cleanup, renewable energies, and biotechnology. Social scores reflect issues surrounding labor relations and conditions such as empowerment, employment of minorities, profit sharing, and many more related ideas. Finally, governance scores involve executive compensation, voting and shareholder rights, board independence and elections, along with auditor independence (Auer & Schumacher 2015).

While rating firms are a good influence on sustainable investments, it still raises concern for investors and policymakers. Studies have argued that ESG scores have a strong correlation with firm size. Larger firms can provide more data and resources for ESG rating agencies, which then leads to them having higher sustainability scores compared to small firms (Drempetic, 2019). On top of this, since the approaches to ratings are so different between agencies, there is a lot of inconsistency on the evaluation of a firms ESG performance (Atkins 2020). Survey evidence from Amel- Zadeh and Serafeim (2018) shows "82% of investment professionals use ESG information in the investment process, but 26.4% also indicate a lack of ESG rating reliability" (Berg 2020). This means that the same firm might have two completely different evaluations depending on what rating agency one is looking at. With a lack of consistency in scores, it forces

3 Pillars	10 Themes	35 ESG Key Issues	
Environment	Climate Change	Carbon Emissions Product Carbon Footprint	Financing Environmental Impact Climate Change Vulnerability
	Natural Capital	Water Stress Biodiversity & Land Use	Raw Material Sourcing
	Pollution & Waste	Toxic Emissions & Waste Packaging Material & Waste	Electronic Waste
	Environmental Opportunities	Opportunities in Clean Tech Opportunities in Green Building	Opportunities in Renewable Energy
Social	Human Capital	Labor Management Health & Safety	Human Capital Development Supply Chain Labor Standards
	Product Liability	Product Safety & Quality Chemical Safety Financial Product Safety	Privacy & Data Security Responsible Investment Health & Demographic Risk
	Stakeholder Opposition	Controversial Sourcing Community Relations	
	Social Opportunities	Access to Communications Access to Finance	Access to Health Care Opportunities in Nutrition & Health
Governance*	Corporate Governance	Ownership & Control Board	Pay Accounting
	Corporate Behavior	Business Ethics Tax Transparency	

Figure 1- MSCI Key Issue Hierarchy

investors to choose the rating agency they use. This study uses MSCI as an empirical rating basis to ensure consistency. The characteristics used by this firm are shown in figure one.

<u>The Rise in Popularity; Creating Value Through ESG</u>

Through the past two decades there has been a surge of academic research surrounding ESG and

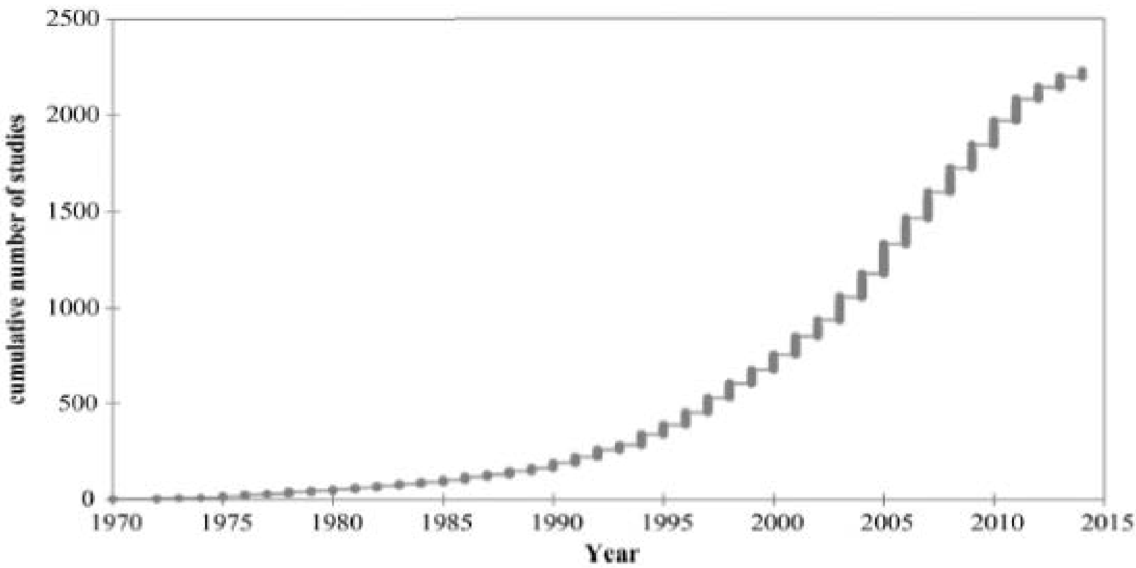

Figure 2- Estimated number of academic studies between ESG and CFP over time

its integration in investment strategies. Figure 2 depicts the estimated number of empirical studies on the ESG and corporate financial performance relationship from 1970-2015 (Friede 2015). There is a clear jump in research beginning around the 1995 period, proving how it exploded in popularity especially after its mention in 2006. Overall, investors were realizing implementing ESG analysis into their strategies could create value. A study completed by Henisz (2019) showed one out of every three dollars under professionally managed funds were being invested according to socially responsible principles. Furthermore, between April and June 2020, investment firms which incorporated ESG principles attracted net inflows of $71.1 billion globally, which pushed assets under management within these funds to an all-time high of over $1 trillion (Atkins 2020).

The concept behind this rise in popularity and value creation is the Stakeholder Maximization Theory. Every firm must ask themselves at some point when all is said and done: How do we measure from the past, better or worse? However, this would imply they have some type of performance measure. Value maximization would contend that if the total long run market value of the firm increased, they did well. However, the stakeholder theory would argue that the performance depends on how it considered the interest of stakeholders in the company (Jensen, 2002). With stakeholders being all people or groups associated with the firm like employees, customers communities, or government officials. The realization was that investing with ESG principles can satisfy both theories.

Basically, firms which act accordingly to social standards can create long term value for themselves. By operating with ESG standards in mind, companies are able to please the employees, customers, and communities (stakeholders) around them. Subsequently, these firms are rewarded with good ESG ratings, and are in a better position to generate top line growth. Government officials are more likely to trust these companies with new projects and approve licenses and resources, allowing firms to tap into new markets and expand into existing ones (Henisz, 2019). Taking all this into account, a firm can increase their long-term value and please stakeholders with a responsible business practice. By fulfilling the three ESG pillars, they are pleasing the communities and customers around them with morally correct principles. For example, Mckinsey research has found over 70% of customers are willing to pay an additional 5% for a green product if it performs the same as an alternative not as sustainable. Furthermore, they can increase their long-term value by having these opportunities to access new resources and expand into new markets. Overall, we are seeing this performance enhancement as a study completed in 2007 revealed nearly a 9% return when purchasing stocks with high ESG ratings and selling those with low ESG ratings (Kempf & Osthoff, 2007).

<u>The Energy Sector and the S&P 500</u>

These studies are commonly inclusive of all sectors in the marketplace, from financials, to technology, to communication. Meaning the portfolios are not restricted to holding only technology companies. However, it is clear each sector is more susceptible to specific ESG pillars over another. For example, a company like Facebook would be more at risk in the social pillar, because they deal with millions, if not billions, of private data points from users. Since this study focuses on energy companies, our portfolios stand more at risk with environmental issues including the scarcity of resources, climate change, pollution, employment, and much more-increasing the need to conform to corporate responsible behavior as both an incentive and a requirement (Stjepcevic & Siksneltye 2017).

The original S&P 500 index was established in 1957 and is widely considered as one of the most used benchmarks for measuring financial performance, as it is constantly updated to include 500 of the leading companies from thriving industries in the economy (Siegal & Schwartz 2006). Of the twenty largest firms included in these sectors, at the very beginning of the index nine of them were oil companies, all which outperformed the index by 2-3% for over 46 years, showing how important energy companies are for the health of the economy. Today, advancements and trends have shifted the index, and the biggest sectors include information technology and health care (Ross 2020). As of 2020, the energy sector made up only 2.53% of the S&P 500 index, a steep drop from its original weighting. It consists of nonrenewable energy companies, which mine product like oil, and renewable energy companies. These firms use resources which naturally replenish like sunlight or wind. Since renewable energy companies are relatively new, they have small market capitalization compared to big oil companies, some which have been around for over a century. Therefore, these renewable energy companies have not found their way into the

Sector	Industry	% Of Sector
Energy	Integrated Oil and Gas	50.88%
	Oil & Gas Equipment and Services	8.13%
	Oil & Gas Exploration and Production	20.30%
	Oil & Gas Refining & Marketing	11.51%
	Oil & Gas Storage & Transportation	9.18%

Figure 3- Breakdown of the Energy sector in the S&P 500

S&P 500 just yet as they do not meet the criteria to be admitted. The breakdown for the energy sector in the S&P 500 can be seen in figure 3.

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DATA

Sample

To begin my analysis, my first steps involved gathering a sample from the massive population of energy companies. I began by obtaining four energy ETF's.

1. XLE- The Energy Sector SPDR Fund
2. XOP- The SPDR Oil & Gas Exploration & Production
3. TAN- The MAC Solar Global Index
4. ICLN- The IShares Global Clean Energy ETF

Both the XLE and XOP include companies that handle nonrenewable energy like coal, natural gas, oil, and nuclear energy. The TAN and ICLN hold companies that handle renewable energy which is not depleted when used, such as wind or solar power. After sorting, my sample was concluded with 78 companies, 43 renewable and 35 nonrenewable. From here, I needed to find reliable financial data for the sample. Using the Center for Research in Security Prices database, I downloaded monthly adjusted returns including dividends, shares outstanding, adjusted closing prices, and tickers for each company from 2018-2021. The four-year window was applied solely because rating agencies change their methods so often, it was important to have the ratings as consistent as possible. At this point I moved on to obtain the returns for my benchmark: the S&P 500. Using the same method, I downloaded the monthly returns for the index from 2018-2021.

Measures

My measures included data from an ESG timeseries database (Q1 of 2018) which laid out, for each company in my sample, their most recent ESG scores from Morgan Stanley Capital International. This included a rating on the AAA-CCC scale, their industry adjusted score, weighted score, along with an individual score for each ESG pillar. Figure 4 is an example of a company rated through MSCI.

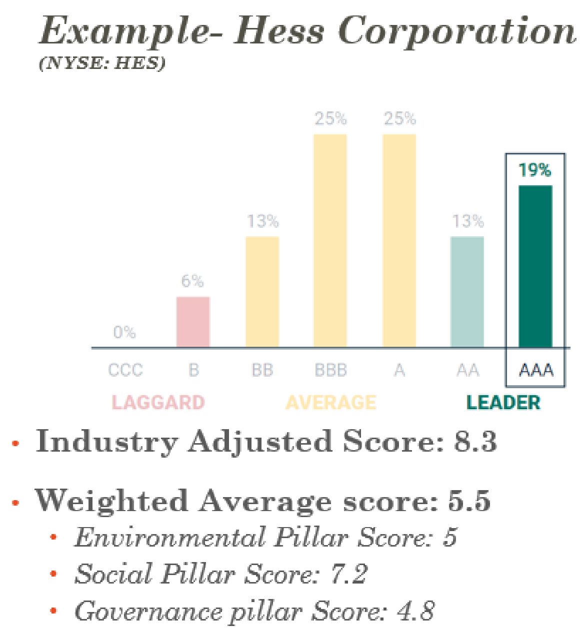

Figure 4-MSCI rating of Hess Corp.

The letter grade shows the highest possible rating for Hess at a triple A. The industry adjusted score is then just a direct translation from that letter grade. The weighted average score is the industry adjusted weighted based on their peers. Finally, the three pillar scores are how the firm fares in each factor.

METHODOLOGY

Once the information was sorted and organized for the 78 companies in our sample, I began to further sort them based on ESG score. I split them between renewable and nonrenewable energy companies, leaving two groups. From here, I found the median industry adjusted score for each group. While the industry adjusted score is a 0-10 rating, the medians both fell below 5. The median score for the nonrenewable group was a 4, and the nonrenewable group was a 4.7. I split each group once again based off if they were above or below this median score. In the end, the sample was split into four portfolios.

1. Renewable energy ESG leaders (21 holdings)
2. Renewable energy ESG laggards (22 holdings)
3. Nonrenewable energy ESG leaders (19 holdings)
4. Nonrenewable ESG laggards (16 holdings)

I then calculated the market capitalization for each company from January of 2018 by multiplying their adjusted closing price by the total outstanding shares. This number is a measure as to how much the market thinks the company is worth at that point in time. After this, I took the sum of the market capitalization from each portfolio, and divided it by each company's market capitalization to get the individual market capitalization weighting for the portfolio. I also took the equal weighting for each portfolio simply by dividing one by the number of holdings in each portfolio. Meaning I had two separate weightings for all four portfolios, which can be seen in the appendix.

Using the monthly returns downloaded from the CRSP I found the monthly holding period return for the portfolio by summing the products of each return by its weighting, giving me two columns of monthly returns. Figure 5 is an example of how the monthly holding period return was calculated for all portfolios.

(Company_A_2018January_Return * Equal_Weight%) + (Company_B_2018January_Return * Equal Weight%)… etc.

(Company_A_2018February_Return * Equal_Weight%) + (Company_B_2018February_Return * Equal Weight%)… etc.

(Company_A_2021December_Return * Equal_Weight%) + (Company_B_2021December_Return * Equal Weight%)… etc.

Figure 5- Example of how holding period returns were calculated

Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is a regression model which describes the relationship between systematic risk and expected return for equities. Essentially, it is a helpful method to price securities fairly taking its risk and time value of money into account. To run the CAPM model, the risk-free rate must be calculated. For this study, the 10-year treasury bill rate was taken monthly through 2018-2021. This is seemingly a “risk free” investment since it is backed by the full faith and credit of the US government. From here, I subtracted the risk-free rate from the monthly holding period returns for each portfolio, to get excess return. This same process was followed with the S&P500 returns, leaving 3 different columns of excess returns shown in figure 6. From here, a regression was ran using one portfolio excess return as our dependent variable, and the S&P excess return as the independent variable, acting as the market return. The regression results display the alpha or excess return on our portfolio compared to the S&P. It also calculates the beta, which is the measure of volatility and risk compared to the market. A beta of 1 shows no risk, while an increase indicates more volatility.

RESULTS

In a perfect world, this study would see the greatest returns centered around the renewable leaders in energy portfolio. In this situation, the companies are being morally and socially

(EW)Portfolio Excess Return	(MW) Portfolio Excess Return	S&P Excess Return
-0.9679%	4.53170%	6.17359%
-6.9399%	-10.64671%	-3.63844%
5.4058%	-0.18249%	-3.13129%
2.7106%	5.16684%	0.91695%
9.3070%	4.14051%	2.42853%
0.7862%	1.47523%	0.12312%
1.8012%	-0.12508%	4.16785%
0.1625%	-0.99449%	3.18966%
-3.0820%	2.99637%	0.13865%
-6.5027%	-8.07846%	-6.49165%
-1.4278%	-1.82339%	1.85241%
-13.6688%	-12.96046%	-9.33656%
14.1155%	10.82848%	8.63509%

Figure 6- A snippet from the leaders, nonrenewable portfolio showing excess returns

responsible, stakeholders are satisfied with where their money is going, while in the end both the firm and investors are seeing return. However, different factors must be considered as to why this did not happen in this study.

<u>Empirical Results</u>

The information displayed below in figures 7 and 8 show basic statistics calculated from the holding period returns in each portfolio. The "Avg Return" indicates the average monthly holding period return. Variance is a measure of the dispersion of returns in a portfolio. It is also an indication of correlation between securities in a portfolio, meaning how likely they are to move together.

Nonrenewable			
		Equal Weighted	Mkt Cap Weighted
Leaders	Avg Return	1.95%	0.44%
	Variance	0.9690%	0.914%
Laggards	Avg Return	3.139%	1.019%
	Variance	2.2485%	2.166%

Figure 7- Nonrenewable portfolio statistics

Renewable			
		Equal Weighted	Mkt Cap Weighted
Leaders	Avg Return	1.513%	1.484%
	Variance	1.0010%	1.821%
Laggards	Avg Return	3.315%	2.722%
	Variance	3.1026%	4.162%

Figure 8- Renewable portfolio statistics

The highest average return belongs to the equally weighted renewable laggards portfolio with an average monthly return of 3.315%. The market capitalization weighted portfolios showed a common theme of having a lesser return. In essence, weighing by market capitalization provides the least risk with the greatest amount of potential return by increasing exposure to higher valued firms. On top of this, variance proved to be higher within the laggards of both renewable and nonrenewable.

CAPM Results

Figure 9 shows an example of the regression results after running the Capital Asset Pricing Model on a portfolio. This includes the coefficient for both the intercept and x variable- the market return. The intercept coefficient indicates the alpha generated, while the variable coefficient is the beta.

	Regression Statistics				
Multiple R	0.798097292				
R Square	0.636959288				
Adjusted R Square	0.629067099				
Standard Error	0.061579935				
Observations	48				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.306050173	0.30605	80.70755239	1.09673E-11
Residual	46	0.174436066	0.003792		
Total	47	0.48048624			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-0.00857123	0.009271246	-0.9245	0.360052704	-0.027233281
X Variable 1	1.598639668	0.177948158	8.983738	1.09673E-11	1.240448604

The CAPM model also calculates the R-square statistic. This is a representation of the proportion of the variance for our portfolio returns which can be explained by the market return. In this example, the R-squared sits at 63.7%. This indicates the portfolio does not follow the S&P500 performance very well. As if it was closer to 1 or 100%, the portfolio would mimic the index's performance. The R-square sits around this number for all CAPM regressions.

Figures 10 and 11 represent the final CAPM results from each portfolio.

Nonrenewable			
		Equal Weighted	Mkt Cap Weighted
Leaders	Beta	1.5	1.44
	Alpha	-0.2632%	-1.693%
Laggards	Beta	2.03	2.21
	Alpha	0.1251%	-2.259%

Figure 10- Nonrenewable portfolio CAPM results

Renewable			
		Equal Weighted	Mkt Cap Weighted
Leaders	Beta	1.6	2.07
	Alpha	-0.8571%	-1.582%
Laggards	Beta	2.400	2.715
	Alpha	-0.2436%	-1.3024%

Figure 11- Renewable portfolio CAPM results

The only positive excess return, or alpha, was found in the equally weighted, nonrenewable laggards group at 0.1251%. In all other groups it was negative, indicating the market outperformed our portfolios. On top of this, the betas sat relatively high, with the highest being at 2.7. This shows massive volatility, meaning the returns do not move in tandem with the S&P500 at all.

Explanation of Results

The results were not as anticipated but can be explained by a variety of factors. The average return was highest with equally weighted portfolios verse market capitalization weighted. Market capitalization favors companies with high values, generally with little fluctuation. In this sample, there was a large amount of small cap funds, especially within the renewable groups. Meaning the small cap funds performed well over the four-year period, leading to a higher return in equally weighted portfolios. The variances shown in figures 7 and 8 were generally higher in the laggards group in both renewable and nonrenewable energy. Basically, this shows these stocks with lower ESG ratings have more dispersion than higher rated firms. It also indicates they have little correlation with each other, meaning predictability of return comovement is much lower.

The CAPM regression results showed the only positive excess return compared to the S&P 500 in the nonrenewable laggard's portfolio. While it goes against the stakeholder maximization theory, it can be attributed simply to sheer size and history in large oil firms. An article published by Desilver (2020) described how fossil fuels continue to dominate the US economy. In 2018, fossil fuels led the US economy by feeding about 80% of the nation's energy demand, versus solar and wind energy supplying barely 4% (Desilver 2020). We can see that although renewable companies are on the rise, coal, oil, and natural gas were still the go to energy sources through the 2018-2021 period observed. Additionally, with regards to ESG, we saw poor Environmental pillar scores within this portfolio, with higher social and governance scores shown in figure 12. The reason as to why it was able to generate return in this sample was due to the small cap firms. Since it was equally weighted, the volatile small cap firms performed well through the four years which contributed a lot to the excess return.

Within the renewable energy group, the results showed a lot of volatility. Since many of the renewable firms are small caps, standard deviations proved to be rather high for each firm with some exceeding 50%. It is a representative of the size and performance comparison of renewable and nonrenewable firms.

Environmental_Pillar_Score	Social_Pillar_Score	Governance_Pillar_Score
2.9	6.5	6.1
4.4	6.5	6.2
4.3	1.4	4.7
6.7	3.7	5.8
1.9	3.6	5.5
1.9	3.4	4.9
6.7	3.1	4.5
2.3	6.8	5.4
2.9	5.6	5.4
2	3.3	4.9
3	2.7	3.9
1.7	3.3	5
4.9	7	1.9
4.9	0.6	6.3
2.5	6.5	5.5
1.2	4.4	4.3

Figure 12- Nonrenewable laggard energy firms ESG pillar scores

CONCLUSION

Overall, there was no clear outperformer through this process. While there was only one portfolio producing a positive alpha, it was not high enough to justify that the sample can speak for the population. On top of this, the R-square was only at .45, meaning not even 50% of the returns on the nonrenewable laggards portfolio could be explained by the market returns.

This project aimed to use solely ESG scores as a characteristic to construct portfolios, centered in the energy industry. The results show a great deal of volatility, with little excess return compared to the S&P 500. While more research should be done, it shows that in the energy sector ESG should only be a helping factor in investment strategies, not the end all be all. We are seeing a consistent, dominant performance in oil and gas companies compared to renewable energy firms, a trend which will take a long time to dissipate.

The results additionally make a case for the agency cost theory, which is the opposite of the stakeholder theory. In essence, it argues firms should not spend resources on things such as environmental, social, and governance activities as it will decrease shareholder value (Peng 2020). It believes that it will take away from more important aspects which will generate profits. However, it neglects sustainability and responsible corporate behavior.

The biggest issue with this project is the period it goes through with the Covid-19 pandemic. During this time, the stock market experienced a great deal of fluctuation, interest rates plummeted to near zero, and hundreds of firms failed. This was not a “normal” market. Meaning the results displayed through these portfolios would be difficult to translate to an efficient market.

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APPENDIX

Appendix A- Nonrenewable Leaders Portfolio

Ticker	Company Name	ETF	Rating
COP	CONOCOPHILLIPS	XOP	AA
ED	CONSOLIDATED EDISON, I	XOP	AA
ORA	ORMAT TECHNOLOGIES, I	XOP	AA
TPL	Texas Pacific Land Corp	XOP	AA
ENIA	Enel Americas S.A.	XOP	A
FSLR	FIRST SOLAR, INC.	XOP	A
CLNE	CLEAN ENERGY FUELS COR	XOP	A
INT	WORLD FUEL SERVICES CC	XOP	BBB
EQT	EQT CORPORATION	XOP	BBB
SLB	SCHLUMBERGER HOLDING	XOP	BBB
DK	DELEK US HOLDINGS, INC.	XOP	BBB
PLUG	PLUG POWER INC.	XOP	BBB
XOM	EXXON MOBIL CORPORAT	XOP	BBB
GPRE	GREEN PLAINS INC.	XOP	BBB
RUN	SUNRUN INC.	XOP	BBB
SWN	SOUTHWESTERN ENERGY	XOP	BB
KMI	KINDER MORGAN ENERGY	XOP	BB
HASI	HANNON ARMSTRONG SU	XLE	BB
TALO	TALOS ENERGY INC.	XOP	BB

Appendix B- Nonrenewable Laggards Portfolio

Ticker	Company Name	ETF	Rating
PBF	PBF ENERGY INC.	XOP	BB
REGI	RENEWABLE ENERG	XLE	BB
FCEL	FUELCELL ENERGY, I	XOP	BB
ENPH	ENPHASE ENERGY, I	XOP	BB
OAS	OASIS PETROLEUM	XOP	BB
PDCE	PDC ENERGY, INC.	XOP	BB
HAL	HALLIBURTON COM	XOP	BB
HFC	HOLLYFRONTIER CC	XOP	B
REX	REX AMERICAN RES	XOP	B
EOG	EOG RESOURCES, IN	XOP	B
DQ	DAQO NEW ENERG	XOP	B
FANG	DIAMONDBACK ENI	XOP	B
TT	TRANE TECHNOLOG	XOP	B
NOVA	SUNNOVA ENERGY	XLE	B
CVI	CVR ENERGY, INC.	XLE	B
CLR	CONTINENTAL RESC	XLE	B

Appendix C- Renewable Leaders Portfolio

Ticker	Company Name	ETF	Rating
CIG	Companhia Energetica de Minas Gerais - CEMIG	ICLN	AA
IR	INGERSOLL RAND INC.	TAN	AA
AZRE	AZURE POWER GLOBAL LIMITED	TAN	AA
HES	HESS CORPORATION	ICLN	AA
BRY	BERRY CORPORATION (BRY)	TAN	AA
KOS	KOSMOS ENERGY LTD.	ICLN	AA
CEN	CENTER COAST BRF MLP & EN INF FD	TAN	A
BEPC	BROOKFIELD RENEWABLE CORP	TAN	A
BLX	Banco Latinoamericano de Comercio Exterior, S.A.	TAN	A
AQN	ALGONQUIN POWER & UTILITIES CORP.	ICLN	A
ALTO	ALTO INGREDIENTS, INC.	ICLN	A
CRK	COMSTOCK RESOURCES, INC.	ICLN	A
MNRL	BRIGHAM MINERALS, INC.	ICLN	A
BLDP	BALLARD POWER SYSTEMS INC.	TAN	A
CWEN	CLEARWAY ENERGY, INC.	ICLN	BBB
DVN	DEVON ENERGY CORPORATION	ICLN	BBB
PSX	PHILLIPS 66	TAN	BBB
BKR	BAKER HUGHES COMPANY	TAN	BBB
CTRA	CONTURA ENERGY, INC.	ICLN	BBB
APA	APACHE CORPORATION	ICLN	BBB
VLO	VALERO ENERGY CORPORATION	ICLN	BBB

Appendix D- Renewable Laggards Portfolio

Ticker	Company Name	ETF	Rating
OXY	OCCIDENTAL PETROLEUM CORP	ICLN	BBB
AMR	ALPHA METALLURGICAL RESOUI	ICLN	BBB
DEN	DENBURY INC.	ICLN	BBB
PXD	PIONEER NATURAL RESOURCES	TAN	BB
SM	SM ENERGY COMPANY	TAN	BB
SEDG	SOLAREDGE TECHNOLOGIES, IN(	ICLN	BB
BCEI	BONANZA CREEK ENERGY, INC.	TAN	BB
CPE	CALLON PETROLEUM COMPANY	ICLN	BB
MPC	MARATHON PETROLEUM CORP(	ICLN	BB
EBR	Centrais Eletricas Brasileiras S.A	ICLN	BB
LPI	LAREDO PETROLEUM, INC	ICLN	BB
OVV	OVINTIV INC.	ICLN	BB
RRC	RANGE RESOURCES CORPORATI	ICLN	BB
BE	BLOOM ENERGY CORPORATION	TAN	BB
MUR	MURPHY OIL CORPORATION	ICLN	B
SPWR	SUNPOWER CORPORATION	ICLN	B
MGY	MAGNOLIA OIL & GAS CORPORA	ICLN	B
CDEV	CENTENNIAL RESOURCE DEVELC	TAN	B
MTDR	MATADOR RESOURCES COMPAI	ICLN	B
AGR	AVANGRID, INC.	ICLN	AAA
PARR	PAR PACIFIC HOLDINGS, INC.	ICLN	B
VER	VEREIT, INC.	ICLN	CCC

Appendix E- Equally Weighted, Nonrenewable Leaders CAPM Regression

CAPM
SUMMARY OUTPUT

Equal Weighted

Alpha
-0.2632%

Regression Statistics	
Multiple F	0.758430748
R Square	0.5752172
Adjusted I	0.565982791
Standard	0.065554379
Observati	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regressior	1	0.267686	0.267686	62.29063694	4.26257E-10
Residual	46	0.197679	0.004297		
Total	47	0.465366			

	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.002631527	0.00987	-0.26663	0.790946517	-0.02249805	0.017235	-0.02249805	0.017235
X Variable	1.495090091	0.189433	7.892442	4.26257E-10	1.11378094	1.876399	1.11378094	1.87639924

Appendix F- Market Cap Weighted, Nonrenewable Leaders CAPM Regression

SUMMARY OUTPUT

Mkt Cap Weighted

Alpha
-1.693%

Regression Statistics	
Multiple F	0.752927249
R Square	0.566899442
Adjusted I	0.557484212
Standard	0.064259011
Observati	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regressior	1	0.248624	0.248624	60.21089986	6.70381E-10
Residual	46	0.189944	0.004129		
Total	47	0.438568			

	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.016934944	0.009675	-1.75045	0.086707405	-0.0364089	0.002539	-0.0364089	0.00253901
X Variable	1.440873549	0.18569	7.759568	6.70381E-10	1.067099142	1.814648	1.067099142	1.81464795

Appendix G- Equally Weighted, Nonrenewable Laggards CAPM Regression

Equal Weighted

SUMMARY OUTPUT

Alpha
0.1251%

Regression Statistics	
Multiple R	0.677090901
R Square	0.458452089
Adjusted R Squ	0.446679308
Standard Error	0.112722064
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.494803507	0.494803507	38.94169961	1.26206E-07
Residual	46	0.584488133	0.012706264		
Total	47	1.07929164			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.001251048	0.016971015	0.073716723	0.941555419	-0.032909835	0.03541193	-0.032909835	0.03541193
X Variable 1	2.032687678	0.325734083	6.240328486	1.26206E-07	1.377018976	2.688356381	1.377018976	2.688356381

Appendix H- Market Cap Weighted, Nonrenewable Laggards CAPM Regression

Mkt Cap Weighted

SUMMARY OUTPUT

Alpha
-2.259%

Regression Statistics	
Multiple R	0.750366713
R Square	0.563050204
Adjusted R Squ	0.553551295
Standard Error	0.099383053
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.585461147	0.585461147	59.27525216	8.24297E-10
Residual	46	0.454341598	0.009876991		
Total	47	1.039802745			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.022586737	0.014962743	-1.509531827	0.138001775	-0.052705178	0.007531703	-0.052705178	0.007531703
X Variable 1	2.211074163	0.287188209	7.699042288	8.24297E-10	1.632994282	2.789154044	1.632994282	2.789154044

Appendix I- Equally Weighted, Renewable Leaders CAPM Regression

CAPM

Equal Weighted

SUMMARY OUTPUT

Alpha
-0.8571%

Regression Statistics	
Multiple R	0.798097292
R Square	0.636959288
Adjusted R Square	0.629067099
Standard Error	0.061579935
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.30605	0.30605	80.70755239	1.09673E-11
Residual	46	0.174436	0.003792		
Total	47	0.480486			

	Coefficients	*andard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.00857123	0.009271	-0.9245	0.360052704	-0.027233281	0.010090821	-0.027233281	0.010090821
X Variable 1	1.598639668	0.177948	8.983738	1.09673E-11	1.240448604	1.956830732	1.240448604	1.956830732

Appendix J- Market Cap Weighted, Renewable Leaders CAPM Regression

SUMMARY OUTPUT

Market Cap Weighted

Alpha
-1.58%

Regression Statistics	
Multiple R	0.76536588
R Square	0.58578493
Adjusted R Square	0.576780255
Standard Error	0.088729427
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.51216	0.51216	65.05341966	2.36777E-10
Residual	46	0.362154	0.007873		
Total	47	0.874314			

	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.015817361	0.013359	-1.18404	0.242478436	-0.042707176	0.011072455	-0.042707176	0.011072455
X Variable 1	2.068030856	0.256402	8.06557	2.36777E-10	1.551919756	2.584141955	1.551919756	2.584141955

Appendix K- Equally Weighted, Renewable Laggards CAPM Regression

CAPM
SUMMARY OUTPUT

Equal Weighted

Alpha
-0.24364%

Regression Statistics	
Multiple R	0.680587474
R Square	0.46319931
	0.451529729
Standard Error	0.131830244
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.68983	0.68983	39.69288533	1.02583E-07
Residual	46	0.79944	0.01738		
Total	47	1.48927			

	Coefficients	Standard I	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-0.002436411	0.01985	-0.12275	0.902836463	-0.042388105	0.037515284	-0.042388105	0.037515284
X Variable 1	2.400079685	0.38095	6.30023	1.02583E-07	1.633264726	3.166894645	1.633264726	3.166894645

Appendix L- Market Cap Weighted, Renewable Laggards CAPM Regression

SUMMARY OUTPUT

Mkt Cap Weighted

Alpha
-1.302%

Regression Statistics	
Multiple R	0.664696442
R Square	0.441821359
Adjusted R Squa	0.429687041
Standard Error	0.155698195
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.88267	0.88267	36.41089261	2.57379E-07
Residual	46	1.11513	0.02424		
Total	47	1.9978			

	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.01302389	0.02344	-0.55559	0.581180084	-0.060208864	0.034161084	-0.060208864	0.034161084
X Variable 1	2.714897955	0.44992	6.03414	2.57379E-07	1.809250652	3.620545257	1.809250652	3.620545257