** ECONOMICS 620 **

Allegheny College

Meadville, Pennsylvania 16335

Profitability of ESG Company Scores in Automotive Industry



Jacob Budnar

March 21, 2022

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by

Jacob Budnar

Submitted to The Department of Business and Economics

Project Advisor: **Michael Michaelides **

Second Reader: **Timothy Bianco **

Date: **April 11, 2022**

I hereby recognize and pledge to fulfill my responsibilities as defined in the Honor Code and to maintain the integrity of both myself and the College as a whole.

Jacob Budnar

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Acknowledgements

Thanks to the Economic Department, especially Professor Michaelides, and Professor Bianco with helping me with this project and overview of my work.
Thanks to Dalton Dubois for showing me the ropes of the stresses and bright sides on working on a Senior Comp.

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Abstract

The purpose of this study being done is to determine if investing in automobile companies by ESG scoring is profitable. ESG is split up into three categories: environmental, social, and governance. I will be testing ESG as a whole, the three categories, sub-section of social (employees) and governance (Board), and high and low ESG scores. Regressions will be run to find results if investing with ESG can be profitable. The Y variable will be return on assets (ROA) and the X variables is what's mentioned above. The results from the regressions were not that promising due to most results not being statistically significant. The statistically significant results were E score in year 2019, overall G score, overall board, etc. To conclude everything my results weren't very relatable to the other study and that ESG investing is not that profitable.

Introduction: ESG

The question of interest that I will be investigating on how profitable ESG is in the automotive industry. ESG investing is a type of investment strategy that incorporates non-financial categories with financial returns into investment decisions. The non-financial categories that makeup ESG can be split into three categories: environmental, social, and governance. In the environmental category, it focuses on aspects such as climate change, land contamination, energy consumption, greenhouse gas emissions, materials, and so on. The environmental category allows companies to be rated on how they implement greener decisions. The social category analyzes how companies manage their relationships with stakeholders, clients, workers, community, and suppliers from where they operate from. It also investigates how companies deal with inclusion and diversity going along with health and safety in the workplace. In the governance category we can see how companies split up executive pay, how they handle cybersecurity, data protection and privacy, and shareholder rights, but also assures that companies avoid conflicts of interest such as bribery, corruption, and political lobbying. Within the three categories, there is a lot of information that can be analyzed to make the right investment strategy.

ESG investing is a type of sustainable investing strategy that can also be related to socially responsible investing, screening, and mission-related investing. Since the introduction of socially responsible investing in the 1960s the evolution of sustainable investing has caught many new eyes. ESG has been growing at a significant amount in both institutional and retail investors. With the popularization of ESG investing, investors want to implement these strategies to help bring down risk in their portfolios. Better ESG ratings for companies are believed to reduce risk and increase the profitability of a portfolio. These investors have strategies on how they pick or select what companies they want to invest capital in. Since ESG can mean different things to different people they have different ways on how they select such companies to invest in. Integration is one of these ways that investors look at when looking to invest in said company. Investors believe that integrating portfolios with ESG inclusive companies will improve their investment results and help with the overall risk to return. Higher-rated ESG companies have shown long-term financial performances with lower risk. Another strategy is investing with personal values. This is where investors are investing in companies that reflect their values. ESG provides a new avenue to align their investments with their ethical, political, and religious beliefs. It can help the investor to shift through companies that they find controversial. Lastly, this strategy is investors looking to make an impact with their investment into a company. Investor wants to make a change or difference in the world

on what they are investing in. These investors will look at companies that are providing ways to combat issues such as social and environmental issues along with impacting their financial returns.

In this study, I will bring the reader along to show how ESG can be an effective tool. I will first off talk about the history of ESG and where it came from and started to catch popularity. I will then go into why ESG is important for investors and how its growing popularity can affect the market in the future. The study will then bring the reader to different studies on how ESG rating can help with profitability and how using ESG can help with making decisions. The Volkswagen case study shows how a category in ESG showed warning signs to show the investment is risky. The other studies show ESG ratings can create profitability when there are high or improved ratings in ESG, E, S, and G. Finally, the study will show if high or low rated ESG companies in the automotive industry are profitable or not. In that part of the study, it will talk about the methods I use, the data that is used, and the results that came from the analysis. With this study, I want to show how ESG is a useful strategy/tool to use to help with investments to help with lowing risk and with investments being profitable.

ESG and SRI History

Socially Responsible Investing (SRI) and Environmental, Social, and Governance (ESG) have similar tactics for how people will invest in companies. SRI is a type of investing strategy in which investors will develop certain strategies to invest only into businesses that are acceptable to their social values. This goes as well with ESG investing where investors will invest in companies that follow their interest in doing good for the environment or social aspects. Socially responsible investing in the United States is believed to date back more than 200 years ago used by Methodists in their money management practices. The followers of John Wesley the founder of the Methodist movement asked his followers to stay away from profiting at the expense of their neighbors. The followers avoided investing with people who profited through tobacco, weapons, alcohol, and gambling. The actions that took place to not invest with companies that profit through tobacco, alcohol, etc. established screening for socially responsible investments. SRI became popular around the 1960s when used as an investment discipline. Students and young adults protested companies that provided or produced weapons in the Vietnam War, also with rising civil rights and racial equity.

Environmental, Social, and Governance started to become known around the early 2000s. In 2005 a landmark study about ESG came from “Who Cares Wins”. Participants found that the ESG factors

involved have an important role in the context of long-term investments. ESG builds off the growth of socially responsible investing, where also that ESG factors have financial relevance in the market. Advancement in technology for machine learning and big data allows for a better understanding of applying ESG data to other financial data. Around 2013 and 2014 there was a steady growth in ESG investing when studies were published that showed how corporate sustainability performance is associated with good financial results (Kell, 2018). With the maturing of ESG investing, corporations and investors feel the influence that it will change their decisions and actions which can affect market transformation for the better.

Importance of ESG

The importance of ESG investing has been growing over time since it was first introduced, but recently we've seen an increase in companies reporting on ESG. In the last quarter-century, there has been a large increase in companies measuring and reporting environmental (carbon emissions, water consumption, waste generation), social (employee, product customer-related), and governance (political lobbying, anti-corruption, board diversity) data (Amir Amel-Zadeh, 2017). The reason why we see an increase in companies adopting or reporting data on ESG is due to people/investors caring more. Global sustainability challenges such as global warming, sea-level rise, data protection, and demographic shifts are new risk factors that investors are starting to encounter unlike preconsciously before. With modern-day investors today, they may reevaluate their traditional investment strategies as companies face rising problems globally. "Were in the middle of a $30 trillion intergenerational wealth transfer from baby boomers to their children. And those kids- not really millennials only, but people from 25 to 40 years old – simply think about their investment decisions differently" said Dave Nadig (MSCI ESG Investing). This era of new investors wants to make a difference in how they invest in different companies. Millennial investors are more than 2x as likely to be interested in investments dedicated to solving social and environmental problems. With the increase in interest in ESG investing, the market can see in the next couple of decades between $15 trillion and $20 trillion in U.S. domiciled ESG investments, which would double the size of the U.S. equity market (MSCI ESG Investing). The shifts in consumer choice may affect how investment decisions are made in today's era.

Volkswagen Case Study

In mid-September 2015, the German car manufacturer Volkswagen came under fire after publicly installing devices to beat emission tests. The emissions software was installed on more than half-million a

diesel cars in the United States, and roughly 10.5 million other units worldwide (Atiyeh, 2019). The so-called “defeat devices’ allowed the vehicles to pass emission tests set by the Environmental Protection Agency (EPA). When cars were being tested for emission levels the defeat device was able to detect the testing switching emission output. When cars are normally driving the device will switch modes which changes the fuel pressure, exhaust gas recirculation, and injection timing. This mode switch did make the vehicles have higher mileage and power, but it also permitted higher levels of nitrogen-oxide emissions (NOx), a smog-forming pollutant that can be linked to lung cancer. This pollutant was measured up to 40 times higher than the federal limit that can be emitted. The emission scandal is such a shocking scandal due to them promoting their vehicles as “Clean Diesel” an alternative to hybrid and electric vehicles and Volkswagen owns 70 percent of the United States passenger-car diesel market (Atiyeh, 2019). The announcement of cheating emissions has created problems for Volkswagen and investors in the company.

The reason for the scandal against Volkswagen was when the International Council on Clean Transportation (ICCT) and with the help of West Virginia University’s Center for Alternative Fuels, Engines, and Emissions (CAFEE) began testing on-road diesel emissions from cars in the United States. Running these tests, they didn’t believe they would catch Volkswagen or anyone that was trying to exploit emissions. The councils were assuming that American diesel cars are far cleaner than European diesel cars due to the U.S.'s stricter emissions rules. They felt that by having cleaner diesel vehicles they can promote this story which would pressure and shame automakers to improve emissions in Europe (Hakim, 2015). During testing the data collected was being compared with California Air Resources Board (CARB) data but they found discrepancies between the two. The teams went back and forth on data, accusing each other that they forgot to do a crucial step that threw off the data. After checking the data over and over they realized that the software in the vehicle was causing the problem. The Volkswagen car worked well in the field, but the nitrogen-oxide emissions increased by a factor of 15 to 35 times over CARB testing results (Wendler, 2015). The testing of the diesel vehicles was set to travel five different routes that had varying terrain and traffic, in these tests they saw that the Volkswagens set themselves apart from the BMWs used in the test. When looking at the results for Volkswagen on the highway their emissions did not come down, vehicles emissions typically go down when used on the highway. They also saw another red flag when they tested Volkswagens on a dynamometer or a “car treadmill” which the car performed flawlessly. Volkswagen fired back aggressively to the councils saying that they didn’t know what they were doing, the technicalities such as weather conditions and driving styles produced these results. With arguments going back and forth between the two for months, Volkswagen finally gave in, in April they put out a voluntary recall to fix the problem in models that came out between 2010 and 2014 for diesel vehicles. After the software update to those car models,

regulators tested the vehicles finding that the update did not solve the problem. With another continuation, Volkswagen still said it was the tester's fault for their results and not their vehicle. Regulators then decided to look at the vehicle's code finding that the car's computer was changing the emissions put out by the car. With this new finding of the code government officials increased pressure on the company threatening to hold back on approval for its 2016 Volkswagen and Audi diesel vehicles. This eventually forced Volkswagen's hand into confessing about emission output, according to the E.P.A. (Wendler, 2015). After the scandal came out the chief executive Mr. Winterkorn resigned saying that he had no knowledge of the trickery "I am not aware of any wrongdoing on my part" and "Volkswagen needs a fresh start".

With the news coming out about the Volkswagen scandal it put investors in a difficult spot regarding how to look at future investments. As investors take note of this situation, investors may want to start looking into different strategies such as ESG to possibly help catch risky investments into companies. A manager at Acadian Assert management, Asha Mehta said that they didn't invest in Volkswagen due to believing the company had too many risks. She also mentioned that Volkswagen flagged its systems due to governance and labor concerns. Both categories are important signs that have an impact on their returns (Mooney, 2016). Hermes Equity Ownership Services another company that had data about Volkswagen's corporate governance was fast enough to get out of Volkswagen in August before the emissions scandal came out. The plummeting corporate governance score was a red flag for this investment company where they favor companies that have good governance but also favor companies with increasing governance. They saw that Volkswagen's governance score fell from the mid-70s to the mid-60s, a reason for them to back out of this investment (Funds Europe, 2015). Other fund managers were unfortunate and lost out on the scandal, such as Stockholm-based Nordea Asset Management. The Nordic region's largest investment house, which controls around 191 billion euros in assets banned its managers from buying any more shares in Volkswagen for six months. ESG in recent years has helped fund houses that are considering them more to help with their decisions in future investments. With Volkswagen and other disasters like the BP oil spill, ESG reports have helped reinforce fund managers' views that they just can't look at annual reports when making investing decisions. Mr. Beslik head of sustainable finance at Nordea is pushing toward paying more attention to paid ESG factors to help with the investment process. Ralph McClelland an associate director at Sackers who works with pension funds found that taking ESG into consideration looking at governance and listing companies that act with regard to the environmental landscape, helps with the long-term value of companies (Mooney, 2016). When looking into ESG factors you can't just look at E, S, and G separately to help with warning signs when looking at investments. Mehta agrees that is it beneficiary to look at each ESG factors, but looking at governance a bit closer can

be important to help guide future investments. Hemes Investment management a UK fund house did research, and their study found the companies that have poor corporate governance scores tend to underperform well-governed companies by an average of 30 basis points per month (Mooney, 2016). Volkswagen before the scandal was ranked among the worst large, western companies in terms of governance by several agencies. Research done by MSCI ESG found from their MSCI ESG Impact Monitor flagged Volkswagen on controversies put under the headings of product and service quality, bribery and fraud, and collective bargaining between the years 2013 and 2015. In 2015 of April, Volkswagen's governance score was in the bottom 28th percentile of companies that MSCI ESG covers. Their G score has also been declining since last year, 2014. In the ESG scoring system of MSCI ESG Ratings, Volkswagen was upgraded from 'BBB' from 'BB' in August 2015 due to its steps in the lower environmental impact of its products. They reduced vehicle fleet carbon emissions and recall rates in recent years. And following the scandal in September 2015, Volkswagen's ESG score dropped from 'BBB' to 'CCC' and to yellow to red flag for MSCI ESG Impact Monitor (MSCI, 2015). SVM Asset Management also found that Volkswagen's voting structure gave some investors more votes than others. This is concerning due to disproportionate voting rights can lead to costly long-term relationships and can affect environmental or social efforts. Having improved or better governance in a company can help with bringing in more investments and leading to other sustainability factors.

Overall, the scandal that Volkswagen put itself in hurt itself and its relationship with current and future investors. It also brought light to ESG factors and how they can be tell-tale signs for investors if a company is risky or not to invest in. Volkswagen is a great case to study for the importance of ESG investing due to seeing two sides where one side took account of governance, one part that makes ESG, and the other side which did not take account when investing. The companies that had the data on the governance score in Volkswagen were able to stay away or pull out investment in the company to not cause financial risk. Unfortunately, the companies that didn't take account of this data lost a lot of capital when news broke out about Volkswagen. This scandal was able to give us evidence that poor corporate governance can cost billions for people. It also shows that just looking at one aspect of a company such as environmental or social cannot give you all the signs needed for investing. Better verification from companies for ESG scores and research can help with lowing the risk on investments.

ESG Score Profitability

ESG investing can be linked to a decreased risk with higher profitability and higher dividend returns. This is the opposite with low-rated ESG companies that may increase the risk of that investment or portfolio and possibly have a lower return of profitability. Investors believe that they will get more return from their investment in higher-rated ESG investments. ESG score is positively associated with firms' profitability captured by means of Returns on Assets. In brief, when the ESG score increases by 10% the profitability measure increases by 0.4 (Pellegrini, 2019). Having a high-rated company can be eye-catching to investors to investigate if this company follows their morals to invest in them. BMW increased its ESG score from 86.07 in 2017 to 88.64 in 2019, making BMW the third company with the highest ESG score in the industry just behind Fiat, Chrysler, and Daimler. Also, BMW almost reached a perfect score of 100, in the environmental pillar with a score of 98.24 ranking them second in the industry (NOVA, 2021). Being able to produce and report good results from the year can lead to more investments into the company due to people's interest in how the company is run or believe it will decrease their risk in the investment.

A study by Brogi and Lagasio investigated how ESG and company profitability is measured by return on assets (ROA). The sample that they were able to collect data from was from 17,358 observations over 3,476 companies over the period 2000 to 2016. The ESG score rating was based on MSCI ESG KLD STATS. They ran a regression model to test profitability measured by return on assets related to ESG scores over four different models from ESG, E, S, and G scores. The results from the four models confirmed their hypothesis, which found that ESG score is positively and significantly associated with ROA_t and ROA_{t+1} (Brogi, & Lagasio, 2018). With the breakdown between each dimension of ESG score, with E and ROA they found it positive but not very significant. The S score was positive and statistically significant at 1% association and with the G score, they found it positively associated with both ROA_t and ROA_{t+1}. The improvements in ESG strengths have the greatest effect on the profitability on the year.

A study by Maria Balatbat looked at ESG scores and the influence on firm performances from companies listed on the Australian Securities Exchange. The ESG scores were from 2008 to 2010, where the company's financial scores were measured by financial ratios to find profitability and equity valuation. They were able to obtain data on 208 companies in the following sectors: construction, banking, oil and gas, mining, media, general retail, industrial, food and beverage, energy and utilities, support services, and travel. The hypothesis that Balatbat was looking for is firm performance is positively correlated with ESG scores, across industry sectors. The results from the findings found that the oil, gas, and mining

sector was the worst-performing and that the banking and financial sector outperformed all the other sectors. The maximum score in the study was 46 and the minimum was -23. The results from the study found that there was a strong positive link between financial performance and sustainability practices measured by ESG scores, it could not be established by looking at financial performance measures one at a time (Balatbat, 2012). The majority of the regression coefficients fell below the 0.5 thresholds they determined which suggested a weak correlation with financial performance. From a multi-linear regression analysis, only one measure of financial performance showed ESG as being statically significant. Another thing that could be said from the results is that the impact of ESG scores on financial performance may not be able to capture in the time frame that was studied at 1 and 2 years. There may need to be a longer study to see better results in financial performances for companies. There could also be a blurring between ESG practices. There can be practices that affect a firm's profits while some of the other firm's practices could negatively affect profit or not add any value too.

A study by Maja Barbaric investigated ESG scores and financial performance of Swedish listed companies. The regression analysis consists of 69 Swedish companies that have a market capitalization of over 10 billion SEK (Barbaric, 2021). The data was collected from the Refinitiv Eikon database and the company's public record. One of Barbaric's hypotheses is that ESG has a positive impact on ROA. ESG has the strongest positive correlation with ROA in the figure provided. From the first model the findings found that there is a positive and significant relationship between ROA and ESG $\beta = 0.0007$; $p < 0.05$, which supports Barbaric's hypothesis. With a small coefficient, it can be determined that improving ESG performance leads to a small increase in financial performance. This small increase can be expected due to changes in ESG are on average small and graduate. The results from this study went with the study expectations with investing in ESG activities will pay off. The payoff from ESG investing comes in many different categories from environmental, social, and governance aspects of a company's operations.

Overall, ESG investing can be linked to a decreased risk with higher profitability and higher dividend returns. You can see that from the three studies provided that two of them (Brogi and Lagasio), (Maja Barbaric) found that companies with better ESG or improving ESG can lead to an increase in firm financial performances or an increase in ROA. The study (Maria Balatbat) found that ESG scores did not have a large effect on the financial performance on firms.

Environmental (E) Score Profitability

The environmental score measures the impact of a firm on living and non-living natural systems. These natural systems include land, water, air, and complete ecosystems. Environmental scores are also graded on the firm's management of climate change, land contamination, energy consumption, greenhouse gas emissions, and materials. The score is able to represent how well the firm manages the decrease in environmental risk and is able to maximize environmental opportunities to create shareholder value. The environmental score is rated on three different categories that consist of indicators: resource use, emissions, and innovation. The number of indicators per category determines the overall environmental score.

In the study by Tuomas Manner who evaluated ESG's impact on firm profitability, valuation, and cost of debt, we can see how 'E' can affect the return on asset (ROA) and return on equity (ROE). In the findings, there were significant coefficients found in high environmental scores and in the low environmental performance. In the high environmental performances, they had negative loadings on return on equity at -9.32 at a 99 percent significant level. Firms with high environmental (E) performances have lower ROE. High environmental performances are able to generate the most consistent and significant coefficients across all the models that were tested. From the model, the numbers range from 0.08 to 0.29 at a 99 percent confidence interval and 95 confidence intervals (Manner). Due to the significant evidence from the model, we are able to see that environmental performance can have an effect on higher valuation for firms.

In the study by Jun Xie and other authors, they investigated the relationship between corporate efficiency and corporate sustainability to find if firms that are concerned with ESG are efficient and profitable. Their hypothesis for 'E' is that "Environmental activities that are cost-cutting are positively related to corporate efficiency" (Xie, 2018). They found from their results that E scores have a mixed relationship with corporate finance. At low and middle disclosure levels, the E score shows an upward trend with corporate efficiency. But if the E score has a score greater than 75 points the efficiency trend will decrease when E increases. There is a significant and positive relationship between E score and corporate efficiency with low and lower-middle discourse levels. There is no significant association with a negative E score related to corporate efficiency at a high discourse level. When a firm attempts to maintain a high level of discourse and environmental performance in the long run, this can lead to negative signals that can destroy corporate reputation. Companies having environmental policies create corporate efficiency and

market value that is significant and positively related. Firms that created a green building policy is 0.036 higher than other companies that do not. Also, ROA is higher if firms take the necessary actions to use environmental technologies and principles. Improvements only occur if policies are to enhance environmental policies and improve performance.

Overall, when a company focuses on one pillar of ESG it can have a positive effect on a firm's financial performance. As you can see from (Tuomas Manner), and (Jun Xie, and other authors) E plays a part in increasing a firm's performance and valuations.

Social (S) Score Profitability

The social score measures the management practices of a firm to create trust and loyalty with its workers, customers, society, and shareholders. The score should represent the company's name and reputation which helps with determining shareholder value in the long term. There are four different categories: workforce, human rights, community, and product responsibility (Reuters, 2018). Again, the number of indicators per category determines the overall social score.

From the study of Tanner Manner, we can see how 'S' affects return on assets and return on equity for firms. High social performances are linked with higher ROA at 3.41 percent at a 99 percent confidence level. If the social performance is low the link will be negative. The social dimension that supports Manner's hypothesis is that high ESG performance contributes positively to form profitability (Manner). Low social performance has a positive loading on ROE at 6.45 percent at a 95 percent confidence level, this suggests that firms with low social performance are linked with better ROE. If profitability is measured by ROA, having a high social performance will lead to higher ROA, and vice versa with lower performance. If profitability is measured by ROE then poor social performances result in higher returns.

The study from Xie and others investigated 'S' and its relationship between corporate efficiency and corporate sustainability to find if firms that are concerned with 'S' are efficient and profitable. Their hypothesis for 'S' is that "Social activities that enhance corporate reputation and attract capable employees with little additional cost are positively related to corporate efficiency" (Xie, 2018). The 'S' score was found to have a weak negative relationship at a low disclosure level and there was a negative trend at a high disclosure level but isn't as reliable due to a wide confidence interval. Corporate efficiency and market value are positively affected when there are equal opportunity and training policies in firms. Scores for firms with efficiency scores that have equal opportunity policies are 0.043 greater than those of

other firms at a 99 percent significance level. With the adaption of human policy also has a positive relationship with a market value that has a coefficient of 0.064. This is higher than those with equal opportunity and training policies. They found from their results that the hypothesis is correct and that social activities that enhance corporate reputation and attract employees, that can relate to corporate efficiency.

From the studies provided we can see when 'S' is incorporated into a company it can lead to a positive return in ROA or incorporate efficiency. The study by (Tanner Manner) and (Xie and others) is able to prove that improvement in the 'S' score can lead to better firm performance.

Governance (G) Score Profitability

The governance score measures the firm's governance and investigates the systems and processes in that board members and executives are acting in the best interest of their shareholders. There are three categories that the governance score is based on: management, shareholders, and CSR strategy. Indicators that can be put under one of these three categories are how do companies split up executive pay, how they handle cybersecurity, data protection and privacy, and shareholder rights, but also assures that companies avoid conflicts of interest such as bribery, corruption, and political lobbying. The number of indicators per category will determine the overall score for governance. The score is able to reflect the firm's management practices where they have the responsibility and control of checks and balances, as well as incentives to help create long-term shareholder value.

In the study from Manner, we are able to see the effect of 'G' on a firm's profitability on return on assets, and return on equity. High corporate governance is linked negatively ROA at -1.39 percent and low corporate governance has a positive ROA at 1.44 percent both at a 99 percent confidence interval. These results go against the hypothesis that Manner believed in. Results for ROE, having high governance performance has negative loadings at -8.20 percent at 99 percent confidence. Having a high governance score can lead to lower ROE. Out of the other dimensions, governance (G) seems to be the least effective parameter in the model. Also, half of the regression reports a positive and significant impact on governance. A high corporate governance score is negatively associated with profitability and with a low corporate governance score is associated with a higher ROA.

The study from Xie and others investigated 'G' and its relationship between corporate efficiency and corporate sustainability to find if firms that are concerned with 'G' are efficient and profitable. The

hypothesis that went with “G’ is “Governance activities that involve an independent and diversified board of directors are positively related to corporate efficiency” (Xie, 2018). There is a negative relationship with corporate efficiency at the start of the graph. In the middle of the graph or the middle disclosure level, there is a positive relationship, which is also the strongest of the other three. The ‘G’ score has the strongest effect on corporate efficiency. From their results and the variables, they tested for efficiency, ROA, and market value they found that CEO duality is negatively related to corporate efficiency. Women on the board have a strong positive linkage with ROA and market value but don’t have a significant relationship with corporate efficiency. With women on the board, the score is 0.051 higher for ROA than firms that don’t at a 99 percent significance level. Also, with women on the board, the score is 0.597 higher for market value than other firms that don’t at a 99 percent significance level. From the results that were found they could support their hypothesis which stated that the positive effect of G and independent board and the diversified board has a positive effect on corporate efficiency.

Overall, from the studies, the ‘G’ score has a mixed relationship with a firm’s performance and profitability. The study by (Manner) found that firms with high governance have a negative result on ROA and vice versa with low governance. And with the study by (Xie and others) having a diversified board can have a positive effect on corporate efficiency. Governance can be a tough way to measure and investigate if ‘G’ has any effect on a firm’s performance.

Conclusion

As investing keeps advancing with new analytics and new investors joining the market, we see new strategies starting to be adopted. When investing in companies, investors like to build up portfolios that will be profitable and has low risk. This is where environmental, social, and governance (ESG) can come into play for investors as a new strategy to help lower risk for investors. The start of Socially Responsible Investing (SRI) (which can be dated back to 200 years ago) was the building block of the new strategy of ESG investing. In the early 2000s, this is where ESG investing started to catch people’s attention and became a popular strategy for investing in companies. With a landmark study “Who Cares Wins” showed how the adoption of ESG factors can improve the risk of long-term investments. With this study coming out, it gave investors some reassurance that ESG can help with lowing risk in investments. ESG is split into three categories that look at multiple different factors that can affect the score given in each category and overall ESG score. The environmental category it is measuring companies’ ability to be sustainable and resource-efficient. The category of social scoring is measuring companies’ relationships with employees, customers, community, and investors. Lastly, the governance category is looking at the

companies/corporate leadership standards with board diversity, shareholder rights, corruption, etc. ESG allows for investors to get an insight into how companies are running and ranked with other companies to give an investor a choice to invest in a company or not.

Studies and real-life examples show how ESG rating can be helpful in showing or warning investors about potential risky or non-risky investments. Looking at the scandal that broke out with Volkswagen and how they used a defeat system to show that their cars have lower emissions and are more environmentally friendly eventually backed fire. When caught Volkswagen shares dropped a ton and investors lost a ton of money from Volkswagen's shady idea to seem more environmentally friendly. When talking to investing groups some of them either didn't invest or backed out of Volkswagen due to them having data on their poor governance score. With the knowledge of one of the categories of ESG, it deterred these investment groups from other investing in or pulling out of Volkswagen. In other studies, researchers have looked at ESG profitability overall and studies looking at each category's profitability. From the studies that I looked at for ESG's profitability is that higher rated companies were more profitable than lower-rated companies or the rating didn't have much effect on the profitability of the company. Looking at studies about E's profitability I found that having better environmental scores than other companies does help with profitability. With social score and profitability, the studies showed that improvement in S scores and having a good S score can lead to more profitability too. Lastly, with governance we saw mixed results from the two studies, the first study saying that high corporate governance had a negative impact on return on assets and lower governance had a positive impact. The other study showed that governance had the highest impact on a corporate's efficiency leading to better ROA and market value. But we can look back at the Volkswagen case and show that governance is still a good indicator for investors with the other ESG factors to help investors evaluate risk.

Overall, I believe ESG is a good strategy for investors to take part in when investing. Even though it's new and still evolving it has and can impact investors' portfolios by decreasing risk. The studies talked about above help prove that ESG can be an impactful tool to use. Adding to this I hope can add additional information about the profitability of ESG ratings for investors. Hopefully looking at the automotive industry to see if ESG rating affects their profitability or if they improved their ESG scores helped with profitability. Hopefully, my study can be helpful to others and investors that ESG should be considered when looking at companies that you might invest in or are invested in.

Data

The data that I will be using to analyze is companies in the automotive industry. I choose this industry to investigate ESG rating and its profitability to see if this industry sector evolved or diminished in profitability due to ESG scores. Some of the companies that I am looking into for their ESG scores and individual scores are Tesla, Ford, General Motors, Aston Martin, Ferrari, Volkswagen, Toyota, Kia, Subaru, Nissan, etc. The time period that I will be looking at for these companies is from 2017 to 2020. This time period was chosen due to companies ESG scores being more available during this period. If you were to choose scores later in time, some of the company's scores would not be available due to ESG scoring being new and companies willing to put out their scores. In my data collection, there are a few automobile companies that I had to exclude due to them not releasing their scores to Bloomberg. Also, there are a few companies that didn't release their scores for only one or two years, such as Aston Martin in 2017, or Bayerische Motoren Werke AG (BMW) in 2020. The way that I am collecting data for these automobile companies is through the Bloomberg terminals to help me look at automobiles' ESG scores and their ROA. Bloomberg terminals allow me access to real-time global financial data, news feeds, and messages and offers data on the sell-side and independent research from more than 1,500 sources. This also me to get a comprehensive view of industries and their key constituents with data for sectors, industry, and company levels. After collecting data from Bloomberg, I will run it through Stata a program that helps with data analysis. In Stata, the program will allow me to run different regressions on ROA and ESG scores to see if they are their scores allow for profitability. The different regression test I will be testing is ESG score, E score, S score, G score, members on the board, and high and low ESG scores. To test between high and low ESG scores I had to make a threshold so the companies can be split up. The way that I did that was by taking the median of ESG scores which was 45.04. This created a dummy variable where any ESG scores higher than 45.04 would be markdown as 1 and scores lower than that would be marked as 0. By running each regression with these different variables, I can see if these variables have an impact on return on assets (ROA) to determine if they are profitable or not.

With my data collection, I used panel/longitudinal data that helped me organize and measure the data over time. The panel data contains ESG scores and ROA for 40 different automobile companies. Each automobile company has been assigned a number from 1 to 40; the way that you can assign each company a number does not matter. Each of the 40-automobile companies has four rows of data, the years 2017 and 2020. The four years of data for each company are placed on top of each other, with the first year being 2017, then 2018, 2019, and 2020. By setting up the data this way we have to enter the year as a

separate variable. In total there are 147 observations. The other variables include ESG, E, S, G score, board (number onboard), high/low, and the number of employees.

The variables that were chosen to help run this model were picked for certain reasons. Return on assets (ROA) was chosen because ROA gives investors the right insights into how effective a company is in converting investments into net income. A higher ROA means more asset efficiency. ROA was chosen over return on equity (ROE) because ROA deals more with operating management compared to ROE which looks at capital and financial management. ROA seems like a better choice for this model because focusing on ESG for companies comes with a lot of operating management to meet different needs of producing good ESG scores. The variable board is the number of board members each company has, and I wanted to test to see if the number of board members affects the profitability of a company. From Troy Segal, if there are more than nine members on the board this may make the board too big to function effectively. Being able to understand a company's structure of its board can help with understanding the company's strengths and weaknesses (Segal, 2021). The next variable looked at is high/low which is looking at ESG score and if they had a higher threshold of 45.04, they were marked high. When using this variable in the model it was used as a dummy variable mentioned above, I am trying to test if high ESG scores are profitable. And lastly, the variable of employees is the number of employees that the company has. Choosing this variable to test against profitability is due to seeing if more employees are profitable or if the increase of employees per year helped with profitability.

(Table 1)

A Four-Year Panel Data Set on ESG Scores

obsno	company	year	ESG Score	E Score	S Score	G Score	# on Board	H/L	Employees	ROA
1	Tesla	2107	18.6	3.88	19.3	51.79	9	0	37,543	-7.64
2	Tesla	2018	26.86	17.38	22.81	51.79	11	0	48,817	-3.34
3	Tesla	2019	26.86	20.16	22.81	46.43	9	0	48,016	-2.69
4	Tesla	2020	30.99	27.91	31.58	37.5	9	0	70,757	1.67
5	Toyota	2017	50	55.04	36.84	51.79	9	1	364,445	3.81
6	Toyota	2018	52.48	57.36	36.84	57.14	9	1	369,124	5.04
7	Toyota	2019	55.37	62.79	36.84	57.14	9	1	370,870	3.68
8	Toyota	2020	56.2	64.34	36.84	57.14	9	1	359,542	3.85
...121	Mitsubishi	2017	40.5	43.41	22.81	51.79	11	0	29,604	-13.61
...122	Mitsubishi	2018	40.5	43.41	22.81	51.79	8	0	30,507	6.88
...123	Mitsubishi	2019	40.5	43.41	22.81	51.79	15	0	31,314	7.27
...124	Mitsubishi	2020	43.39	44.96	31.58	51.79	15	0	32,171	-1.31

Bloomberg Scoring System

The Bloomberg scoring system is based on public companies that are monitors their environmental, social, and governance (ESG). The scoring system that Bloomberg researchers created was from compiling ESG data from their company selection to help create a disclosure score. This discourse score can help investors assess a company's transparency, risks, and opportunities. The scoring system that Bloomberg has is from 0 to 100. This disclosure score isn't measuring the performance of a company but its transparency. The more information that is disclosed the higher the disclosure score. The lowest disclosure score was 1 in 2014 and the highest was 89. From Bloomberg, there are 11,000 plus companies that Bloomberg looks at and scores. The data coverage of these companies is energy and emissions, waste data, women on the board, independent directors, workforce accidents, and sector-specific. These data coverages come from these data sources to provide disclosure scores, annual reports, sustainability reports, press releases, and third-party research. There are 800 different metrics that are tracked covering all aspects of ESG. Examples of some of the data being tracked are employee training cost, political donations, employee turnover rate, percentage of women employees, etc. In the disclosure scores, there are seven essential indicators ranked by disclosure rates. The seven are in this order payroll, energy, GHGs, water, waste, employee turnover, and injury rate. Only 2.8 percent of the global public companies that are more than 2 billion dollars in market cap, 4,609 disclosed all seven of these indicators, according to Corporate Knights. The more transparent a company is about how they run their businesses the better their disclosure scores will show up in the Bloomberg terminals.

Empirical Section

The data that is shown and tested is from Bloomberg terminals which allowed me to access ESG, E, S, G scores, number on board, number of employees, and return on assets for automobile companies around the world. The data testing was done on software called Stata that allowed me to run a regression to test if these variables affected profitability.

(Table 2)

	COEFF	P-VALUE
ESG SCORE	-.8324487	0.290
E SCORE	.4501705	0.291
S SCORE	.1545331	0.435
G SCORE	-.0718654	0.758

When testing the variables against ROA for profitability I ran all the variables together to get my results. The number of observations in this model was 142 and there were 40 different groups. The results for ESG score, which is my X variable and ROA as Y, there is no significant data to be looked at. There is no P-value at a confidence interval at 99, 95, and 90 percent for ESG score overall the coefficient was -0.83244, and the P-value came in at 0.290, which stated previously that this data is not significant. With these results, we cannot conclude that ESG scores for automobile companies do affect the profitability on return on assets (ROA). Comparing my data and results with previous data by Barbaric who found that ESG scores can have a positive effect on the profitability of ROA. If my data was significant my results would be the opposite of Barbaric where ESG has a negative effect on profitability.

Moving onto the next variable that was tested against profitability is the Environmental score or E score. The results were pretty similar to the results for the ESG score. The results for the E score were insignificant at all levels at 99, 95, and 90 percent. The results for this were 0.45071 for the coefficient and 0.291 for the P-value. Looking and comparing results with Manner and Xie who found that better E scores help with efficiency or profitability, the data that I have if significant would also have a positive effect on profitability.

The next variable is social score, or S score tested against return on assets. With these results, we see the same problem where the results are not significant. The results are not significant at any level of significance at 99, 95, and 90. The numbers from the results of this test are the coefficient is 0.15453 and the P-value is 0.435. It's difficult to talk about results with no significant results but if the numbers were significant, it would affect the profitability of ROA. Looking at the results from Manner who found that social score can impact profitability positively.

Lastly among the three separate ESG categories is the Governance or G score. Again, we have the same problem with results being significant. None of the results for the G score were significant at 99, 95, and 90 percent. The numbers from the result are -0.07186 for the coefficient and 0.758 for the P-value. If the results were significant, we could say that with an increase in G score profitability will go decrease by -0.07186. Comparing the results with Manner where he found that G score can have a negative impact or will decrease profitability.

(Table 3)

	COEFF	P-VALUE
# ON BOARD	.6344505	0.127
# OF EMPLOYEES	.0000438	0.819
H/L	.3855269	0.218

Moving on from ESG and the three separate categories, I also tested sub-categories of the three main categories and a separate variable. The variables that are part of the sub-categories are the number of board members that go under governance and the other is the number of employees which falls under social. The other variable is high/low. The results for the sub-category for the number of board members is 0.63445 for the coefficient and 0.127 for the P-value. The results for this are not statistically significant at any level at 99, 95, and 90 percent. The minimum amount of people o the board for automobile companies was 5 and the maximum on the board was 20. The next variable was to see if the number of employees affected the profitability of ROA for automobile companies. The company that had the highest number of employees was Volkswagen with 671,205 employees and the company with the least is Ferrari with 3380 employees. The results from this test are 0.00004 for the coefficient and 0.218 for the P-value. With these results that these numbers are not significant at any level at 99, 95, and 90. If this number was significant, it wouldn't have much effect on the profitability of automobile companies. Lastly for variables tested is high/low for ESG scores for each company, high is marked as 1 which is higher than 45.04 and low is marked as 0 which is lower than the threshold. The results are a 0.38552 coefficient and a 0.819 P-value. Again, we see with these numbers are not significant at any level at 99, 95, and 90.

(Table 4)

YEAR	COEFF	P-VALUE
2018	.3362867	0.733
2019	-2.889805	0.106
2020	.1711264	0.941

With my model using a panel data set over four years thru 2017-2020, we can see how the variables affect profitability each year. The year 2017 is nulled, and we base the other year's numbers on 2017. The results for the years are 2018 coefficient number is 0.33628 and the P-value is 0.733, these numbers are not statistically significant. For the year 2019, the results were -2.8898 for the coefficient and 0.106 for the P-value. Here we could say that its significant at a 90 percent confidence level, meaning that in 2019 there is a -2.889 decrease in ROA. The results for 2020 were 0.17112 for the coefficient and 0.941. There are no significant results for this year.

(Table 5)

	VALUE
R-SQUARE	0.0427

The last thing to mention about my model is the R^2 value. The R^2 represents the goodness of fit of a model, and the R^2 is a statistical measure of how well the regression predictions approximate the real data points. The closer the R^2 value is to 1 indicates how well the model is. The R^2 value for my model is 0.0427 which is not the best since its far away from 1.

Conclusion

Concluding everything from this model test we can see that the overall results from the data that there were a ton of insignificant data results. Basically, all the variables that were picked for this model were insignificant. The only non-significant number was the year 2019 at a 90 percent confidence level with a coefficient of -2.889. These results were a bit disappointing to see because we can't talk about the results very much or try to compare data with another research without it being significant. If the numbers were significant, we could compare the data to other research data from Barbaric, Brogi, Manner, Xie, and others who found that ESG or the different categories can either positively or negatively affect profitability for companies. Results from these other researchers such as Barbaric found that ESG scores do positively affect profitability but data from Brogi saw that ESG scores had no large effect on financial performance. Comparing my data if significant with theirs found that ESG score has the opposite effect and negatively affects profit. Looking at the separate categories Manner found that a higher social score can be linked to a higher return on assets. Xie found that if companies work on improving their governance score by improving their board that it can have a high effect on corporate performance. Again, comparing my data to if the numbers were significant found that increasing the S score can lead to a little gain in ROA. Looking at the sub-category of G with the variable number on board also has a positive effect on ROA. A good amount of my numbers matched up positively with the other researcher's results, but the downside is none of it was significant. Before testing, I was predicting that I would get good numbers to explain and compare but turns out that was not the case. My hypothesis for this study was that ESG score would affect ROA positively. This could not be concluded due to the results that were found when running the model. Overall, I believe that investing through ESG scores can be positive and profitable just a little if you put enough research into different companies. From looking at my results and others it can be concluded that looking at ESG scores for profitable investing. Moving into the future, ESG investing could become more profitable due to more people understanding it and relying on it for better information on a company and due to it being a newer form of investing and evaluation of companies.

Further Research

Continuing this research and creating better results, there would need to be more observations with a bigger selection of companies, not focusing on one sector, and there to be more reliable reported scores by companies. Having more observations when testing data with regressions it will allow for more accurate results. When having a smaller sample size may not yield valid results it could also better effect the r-square value making the model better. The sectors that I would look at for additional observations to be added to this study to make it more robust are airline companies, and transportation companies. These two sectors would be chosen due to them being partly similar to automobile companies and they may have more ESG scores available. Airline and transportation companies are good sectors to look at is regulations they must follow for emissions for their vehicles, and regulations for the workers such as hours on the job or time off. Another thing that I could investigate is different variables under each category of ESG to possibly help with the model. Since I used board members from the governance category to test profitability other variables that I could test is air quality, material waste, health and safety, and diversity. These variables would be chosen to add a variable to each category of ESG. The one problem with trying to collect data on these variables is hoping that most of the companies in this sector collect and release data about these variables. When searching through Bloomberg for data only a few companies released data for certain variables so it would be hard to run models with only a few companies available. The biggest limitation that I can see when extending research on this topic is companies' reliability in reporting their scores for each category and sub-category. If companies were more reliable in reporting their scores it would allow for investors to make more educated investment decisions and improve model results when testing for profitability. With more available numbers put out by companies when reporting this could decrease invalid or significant results, improving the accuracy of the model. Lastly a variable worth considering for further research and that could have big effects on ESG scorching could be locations. Locations would have been a good variable because different countries have different regulations and laws for how companies can be run and the different labor laws they need to follow. Looking at this you could find pretty big differences between countries and their regulation and laws such as China, Japan, and the United States. With different regulations and laws for different countries, it could have an effect on how ESG scores are calculated and scored. Looking at regulations and laws in Japan we can see harder regulations set for emissions and efficiency for car manufacturers. Starting in the late 1980s, Japan introduced new engine emissions for road vehicles, and in 2005 the Ministry of the Environment had the strictest standards at the time in the world for diesel engines. Looking at Japan's regulations and laws that they have implemented car manufacturers who follow the regulations and go above them could increase their ESG scores. Also, with their regulations Japan

manufactures may get a higher score than other manufacturers just by following the regulations and laws. Comparing regulations and laws with Japan we can see what type the United States has to follow. Car manufacturers in the United States have to follow regulations put out by The National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA). The United States has pretty similar laws and regulations for fuel efficiency and emissions with some differences. The fuel efficiency is set by CAFE in the early 1970s and now CAFE has target efficiency goals for vehicles at 54.4 miles per gallon. With emission laws, it brings in new parts to vehicles such as catalytic converters and other devices to help reduce car emissions. With this type of regulations and laws that these car manufactures have to follow it could help with manufactures ESG score.

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