Sustainability and Performance in the Swedish Equity Market

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I. Introduction

Environmental, Social, & Governance (ESG) investing has been a hot topic over the last few decades. For many corporations, there has been merit behind this demand due to increased shareholder concerns around sustainability, government regulations, and lobbying from activists and labor unions. As of 2018, global ESG assets totaled >$30 trillion assets under management (AUM) which was a 34% increase from 2016. These ESG AUM are expected to grow to 53 trillion USD by 2025, which will represent greater than one-third of expected total global AUM (Bloomberg, 2021). Within the US, ESG growth is following a similar pattern, with 12 trillion USD AUM in 2018, up 38% from 2 years prior.

Although a newer topic, the seeds of ESG have been sown for more than six decades, originating in corporate social responsibility (CSR) initiatives; CSR was first defined by Howard Bowen in 1953: "*it refers to the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action, which are desirable in terms of the objectives and values of our society."* At the time of its introduction, there was a debate regarding whether CSR should even have a role in corporations' pillars – shouldn't the goal of businesses be to maximize shareholders' profits, at all costs? However, after a slew of studies (*Du et al, Dorleitner et al, Wang et al,* among others) provided evidence that reported better CSR practices led to higher capital returns, investors and firms alike began to explore different CSR strategies. The logic behind the higher returns is rather intuitive – firms that treat their employees fairly have more productive employees and better retention rates than their counterparts. This logic can be further extrapolated to ESG evaluation, which is a sub-branch of CSR. ESG monitoring has arisen as a result of CSR evaluation, with a particular focus on sustainability. In the public markets, this can be seen in the form of investing in companies or exchange traded funds ("ETFs) dubbed as 'green,' which are evaluated as such following a pre-investment screen.

There is a disparate spread between countries which are renowned for the sustainable actions they have taken and those that have made minimal efforts in their approaches to sustainability. Yet, there is one Western country which routinely tops all the lists in terms of sustainability rankings - Sweden. As of 2018, Sweden had the lowest carbon emissions per capita in the European Union, in part due to recent mass efforts to lower their carbon emissions. Sweden was the first country in the world to introduce carbon pricing and currently has the highest carbon price in the world at USD $126 per metric tonne of CO_2 produced. Although much research has been performed on the relationship between sustainability and financial performance within the United States, there has been limited research performed on Sweden, whose leading carbon regulations and cultural viewpoints on the environment make it an interesting case study among global stock exchanges.

II. Motivating Theory

For the majority of the last two centuries, since the founding of the first stock exchange in 1790, corporations have acted in line with shareholder theory - which postulates that a company should aim to maximize profits, revenue, or stock price above all else, regardless of the costs. Executives and corporations belonging to the shareholder theory camp are in agreement that investments not allocated towards profit maximization are wasted capital, for both the business and shareholders. Shareholder theory did not arise out of nowhere, however; it originated in capitalist models which argue that productivity is highest - and thus individuals function best - when firms delegate profit maximization as its chief goal, first and foremost.

As mentioned above, although there has been a recent increase in the popularity of CSR and ESG, evidence of businesses going against the grain of shareholder theory can be seen as early as the mid-to-late 1800s in the United States, following the industrial revolution.

As working conditions in factories became exposed, public concern for treatment of workers began to grow, especially for the women and children employed. Proponents of labor regulations and worker rights argued that the current employment practices were causing human rights issues, such as poverty, labor unrest and health conditions. Slowly, labor laws were implemented; within the United States, the Massachusetts Factory Act of 1877 was the catalyst for a slew of laws and regulations which aimed to ensure a safer working environment for employees. Following Howard Bowen's publication *Social Responsibilities of the Businessman* in 1953*,* CSR began to gain traction in the United States. In 1971, the Committee of Economic Development introduced the notion of the 'social contract' between businesses and society, which theorized that companies function due to public consent, so it is therefore an obligation for the corporation to contribute to the needs of society.

We now know from present-day research that a higher-level of workplace safety goes hand-in-hand with higher company performance and productivity: using data from the OECD, Buchele & Christiansen (1995) found that countries with the weakest workers' rights experienced productivity growth rates below what would be expected based on their growth in capital per worker. This can be extrapolated to the corporate level: one such instance is that of aerospace manufacturing firm Lockheed Martin who found that they were able to increase employee productivity by 24% and also reduce factory costs by 20% after implementing a safety culture. A 2020 study found a link between treatment of mine workers and performance: if a mine was deemed as violating worker treatment standards, then miner productivity was 6% lower. If you expand workers rights to not only the issue of safety but to a broader increase of investment in CSR, then the results are similar - Al-Shammari et al (2020) found that, within a group of large public companies, a firm's CSR investment is positively related to firm performance but "that the effect of CSR on performance is stronger for firms with higher levels of R&D capability and operational capability." In other words -

it's more beneficial for larger companies to invest in CSR than their smaller counterparts. These are just a few examples of evidence which disputes shareholder theory - investments in human rights will generate greater returns for the firm in the long run. Now, 80% of the world's 250 largest companies issue annual reports on CSG, yet the issue has now shifted away from CSR's origin (workers' rights) to a different matter.

Within the Western hemisphere, a more pressing cause for corporations has been brought into the spotlight rather than workers' rights: the environment. As new publications come out yearly which detail the effects of carbonization on this planet and the short timeline we have to improve some of the damage of our actions, much of the blame has been placed on governments and corporations for investments in carbon-laden industries, such as energy (ie oil & petroleum), transport and agriculture. This is due, in part, to a counter theory to the shareholder theory: the stakeholder theory (Freeman, 1984), which stipulates that a firm has numerous stakeholders, beyond those that own stock. Although this is traditionally viewed as employees or government entities, it also applies to the consumer, whose collective purchasing power has the capacity to influence firm choices, if they unify and vocalize their demands. The different groups of stakeholders have various amounts of power, yet that does not mean that a firm should ignore the opinions of any of the subgroups.

If you interview Swedish residents, you're likely to find that many of them are passionate about the environment - Greta Thunberg isn't the only Swede campaigning for climate advocacy. This is in part due to Sweden's rich history of environmentalism: it was the first country in the world to pass an environmental protection act in 1967, which it then followed up by being the first country to host a UN conference on the environment in 1972. Currently, more than half of Sweden's national energy supply comes from renewable energy, and there is legislation in the works which aims at further reducing greenhouse gasses, such as going fossil-free by 2045 and utilizing 100% renewable energy. Most recently, in April

2022, Sweden became the first country to set consumption-based emission limits, which extends more to the average household (as opposed to production-based emissions).

These pledges and appetite for environmentalism have caused Swedish companies to take a progressive approach to addressing climate change and reducing their impact, with 31 major companies (including Volvo, AAK, and other major companies listed on the OMX Stockholm 30) adopting science based targets to reduce their climate impact. In a survey done by Action for Climate Transformation in Sweden (ACTS), it was found that among workers in Sweden, 19.9% of them found that businesses were the greatest driving force in Sweden's transition to a fossil-free society, followed by 'civil society' (18.6%). This is bolstered by the fact that 87.9% of respondents noted that the climate issue is prioritized by management, with climate commitment among staff being seen as 'quite good' or 'very good' by 78.6% of employees. It seems that firms, in line with stakeholder theory, are responding to the growing concerns echoed by both their employees and consumers.

I hypothesize that, due to the country's vocal concerns surrounding climate change, that the ESG score of a company in the Swedish Stock Exchange will have a very significant positive impact on the following year's total returns. In other words, with each point increase in ESG score, total returns will increase the next year, due to the social and regulatory ecosystem in Sweden regarding climate change, as well as the smaller size of the stock exchange (with the lower density of firms causing a greater magnitude than in the US).

III. Literature Review

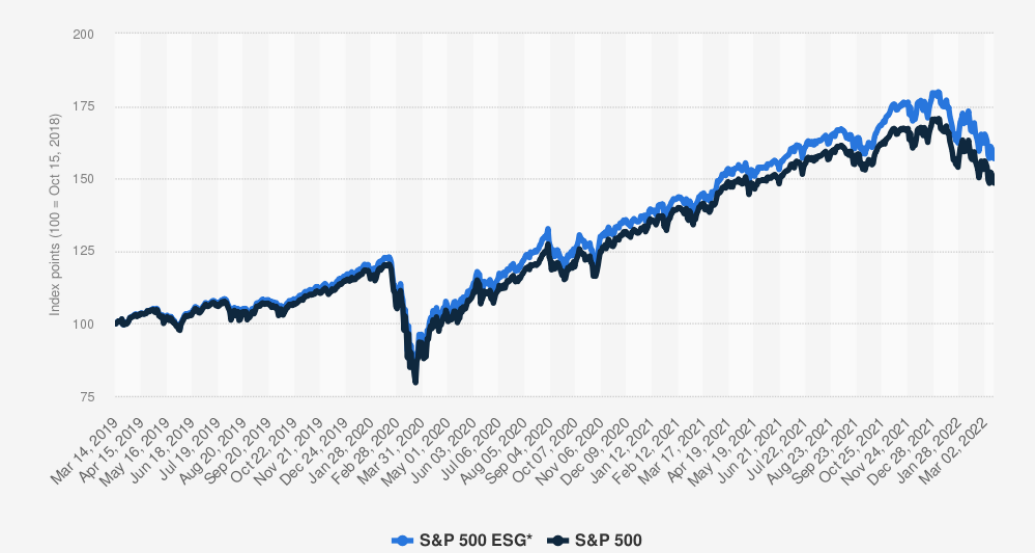
Although little research has been done on sustainability and equities specifically within the Stockholm Stock exchange, there has been an abundance of recent literature published comparing ESG funds vs non-ESG funds. A 2021 Fidelity International report found a strong relationship between ESG quality and dividend growth: firms that possess a strong ESG rating (or high score, in the case of Thompson Eikon) have recorded the highest

levels of dividend growth over the years. Further it's not far-fetched to imagine what will happen to the dividends of companies ranking low in sustainability in the near future - as resources are depleted and carbon and fossil regulations become more stringent, one can only expect dividends to decrease.

When simply comparing recent returns for ESG funds and its non-ESG focused counterpart, the ESG S&P 500 index has outperformed the regular S&P 500 index since Q1 of 2018 until Q1 of 2021 (March 14, 2021). On a global level, in the past 3 years, ESG funds outperformed their counterparts 2.05%[14]. However, these results are potentially skewed due to the coronavirus pandemic: the ESG stock index has a larger concentration of technology stocks, which overperformed due to a global shift to online services during lockdowns.

Proponents of ESG investment argue that ESG stocks do outperform for more long-term, intrinsic reasons: integrating ESG criteria into investment choices can be termed as responsible investing that can enhance performance in the long-term, in terms of financial returns and societal impact. Some critics argue that ESG investments merely outperform the market due to their popularity, however, there is more than buzz around these stocks - ESG investments have lower associated risk, have strong resilience, and longer-lasting, responsible business plans. At the bare minimum, companies with a higher ESG score are less likely to be entrenched in public controversy, which makes for a better, more favorable brand to the public.

Fig. 1: S&P 500 ESG Performance vs S&P 500, 2019-2022



Source: S&P

However, a 2022 study examining the returns of 80 European and 64 US funds, Milonas et al. found no statistical difference between ESG and non-ESG funds, although the ESG-focused funds have slightly higher returns than the latter. The study used a matched pair approach to evaluate the funds and used data from 2017-2021, while also applying the five-factor Fama-French model to control for the impacts other explanatory variables can have on both subsets of funds.

IV. Empirical Strategy

My hypothesis above - that 'greener' companies have higher returns - has been supported within the US and an aggregate of global market returns. However, not much research has been done on individual stock exchanges outside of the United States.

To examine the relationship between a firm's ESG rating and its returns, I obtained all my data from the Thompson-Eiken Asset4 ESG database, which is in line with prior research. On top of providing access to traditional financial metrics, the database measures

environmental, social, and governance factors through more than 200 metrics, including carbon emissions, child labor rights, and diversity & inclusion ratings. To account for all of these factors, the database provides an aggregate ESG Score, which "is an overall company score [from 0 to 100] based on the self-reported information in the environmental, social and corporate governance pillars." Equities which are deemed more sustainable are given a higher score, whereas those deemed poor are given a lower one. With the Good Management theory, I lagged the ESG score by year, in order to examine if the previous year's score had an impact on that year's score

In order to capture a company's performance in relation to its ESG score, I examined yearly total returns (TR). To ensure comparability of the time series, I took the natural log of the TR, in hopes of effectively capturing the compounding effect of the returns year-to-year. TR is the stock price, plus dividends, with the assumption that the dividends are reinvested back into that same stock upon each year. Within the Loose Change Model, I lagged TR by a year to factor in the returns from the prior year and their impact on the ESG score.

The Thomson Eikon database offers a plethora of variables to work with, enabling many controls to take place during analysis. Firstly, I included a measure of firm-based risk to account for the volatility of a company. If a company is a risky investment in the first place, its ESG score should have little impact on the short and long-run returns, making it an important control variable. I will control for risk within the firm by simply dividing the firm's total debt by total assets to calculate the *Debt to Asset* ratio (denoted as 'risk' in my tables).

I also controlled for the variable of size (measured with the total assets metric and revenue metric), as larger companies ultimately have more employees, meaning greater potential bargaining power as discussed in regards to the stakeholder theory: there is the possibility that more employees will lobby not only for positive environmental policies, but also better governance policies for workers, such as employee health and safety plans and

diversity programs and incentives, among others. Larger companies not only have more resources to purchase more costly environmentally friendly infrastructure (i.e. solar panels) or have more resources to offer employee benefits (such as maternity leave), which pays off in the long term. Green infrastructure will also be factored into the "research and development" (R&D) variable I controlled for, as a 2013 analysis found a link between innovation, ESG factors & returns. I controlled for this using two separate measurements - pure R&D expenditure and an innovation quotient, which I created by dividing R&D spending by total assets, in order to take smaller companies into account. I predict a higher R&D spending percentage will correlate to both a higher ESG score and greater TR. To account for year-to-year variations in the market, I am also utilizing the variable 'year' which accounts for each additional year; I anticipate that as time goes on companies' ESG scores might increase regardless, as a result of maturation; this also partially account for systematic risk in the business cycle. Finally, I controlled for cash flow as previous studies have shown that higher rates of cash flow are correlated to higher returns.

Following Landau's (2020) strategy, I performed two different regressions, in line with two differing theories.

1. **The Good Management Theory**

This theory postulates that a firm's yearly returns are inherently linked to their ESG score and that a company's success is dependent on it - the higher the ESG score, the higher TR. In this framework, TR is the dependent variable and ESG is the independent variable. To examine the magnitude ESG has on TR, though, it is important that ESG is temporally lagged by one year to account for the information from the previous year that investors have access to at the time of investing.

$$\textit{Equation I: } TR = \alpha + ESG_{(t-1)} + \beta\ Year + \beta\ Debt + \beta\ Revenue + \beta\ Total\ Assets + \beta\ R\&D + \beta\ Innovation + \beta\ Risk + \varepsilon$$

1. **The Loose Change Theory**

This theory counters the Good Management Theory by hypothesizing that only firms that are doing well have extra money on hand to invest in sustainability measures, thus, they were already on track to have high returns in the first place. In order to explore the relationship, the above equation must be reversed with ESG being the dependent variable and total returns must have a temporal lag of at least one year. In simple terms, this means that, the more robust a company is, the higher the ESG score will be, since they have extra money to invest in more expensive, sustainable infrastructure which boosts their ESG score.

$$\textit{Equation II: } ESG = \alpha + TR_{(t-1)} + \beta\ Year + \beta\ Debt + \beta\ Revenue + \beta\ Total\ Assets + \beta\ R\&D + \beta\ Innovation + \beta\ Risk + \varepsilon$$

V. Data

My original data sample included all firms listed on Nasdaq Stockholm AB as of December 2020 (n=342), sourced from the Thompson Eiken database. Notably, the original sample contained all the companies which are a member of the OMX Stockholm 30, which is the stock market index used for the 30 most-traded companies in Nasdaq Stockholm (previously the Stockholm Stock Exchange). The OMX Stockholm 30 routinely represents about 15% of the market cap in Nasdaq Stockholm and acts as a good proxy for the exchange as a whole. After discarding any securities which didn't have any ESG scores listed since 2009, 283 companies remained, 49 of which had ESG scores for every year 2009-2020. 2020 was the only year which all of the 283 companies had an ESG score reported; that year, the mean score was 47.50 (out of 100), with a minimum score value of 2.07 (Traction AB) and a

maximum score of 95.13 (AstraZeneca). For the purposes of dataset completeness, I opted to only use the 49 firms which had been reporting since 2009.

For my controls, I obtained data for total debt, revenue, YTD total return, total assets (reported yearly), yearly cash flow, and research and development spending.

VI. Results

After performing panel regressions using the above theories of equations, I found that, within the Swedish stock exchange from 2009-2020, the Loose Change theory is most consistent with the firms I examined. After performing a Good Management theory regression (with TR as the dependent variable) it was evident that none of the control variables nor the independent variable (ESG score) impacted total returns significantly. Contrary to my hypothesis, ESG score actually had a very slight (-.004) negative impact on TR, along with year (-.004), revenue (-.0047), total assets (-.0198) & risk (-.229), though the significance levels were all negligible. Debt also had a small (.060) positive impact on ESG, which is difficult to explain. As predicted, R&D and innovation had a positive impact on TR, yet not significantly.

Regarding the Loose Change hypothesis, I did find three variables which affected ESG score: year, revenue & risk - which partially support some of my original predictions. Along with total assets & risk, total returns$_{t-1}$ (-.405) was found to have a slight negative impact on ESG score (though not statistically significant), which went against my initial hypothesis. Amongst all the results in Table III, this proves to be the most puzzling result - an industry breakdown in future regressions might be useful, as there could be high revenue earning firms in a deleterious industry (ie petroleum) causing this number to be skewed. Like the Good Management theory, debt also had a slight, non-significant positive impact on ESG, along with cash flow, R&D, and innovation - all of which I predicted to have a positive impact, even if slight.

VII. Discussion

My findings were not consistent with the previous literature (Landau, 2020) which found a positive, statistically significant correlation within the German equity market between a firm's ESG score and total returns, interchanging both as the dependent variable. Within the regressions, I performed, ESG score was not influenced by total returns (lagged), and total returns was not influenced by ESG score.

In regards to the Good Management theory - the regressions show no statistically significance between the sampled firms' returns and the control variables. However, it is important to note that the r^2 value is low, which is in part due to the fact that there were extraneous variables in my dataset that I transformed and opted not to use the originals (ie non-logged TR)

Pertaining to the Loose Change hypothesis, though, a positive correlation was observed between year (1.53), revenue (.751) and risk (-21.871); all these results are quite intuitive and are, in part, expected. With each additional year, a firm's ESG score increased 1.53 points, on average. This is likely due to firms investing more and into ESG over time as it became more well-known and the climate crisis intensified. Further, there was a negative correlation with debt - the riskier a firm was (ie - the higher the risk ratio), the firm was more likely to have a lower ESG score: each unit increase in risk ratio is associated with a 21.87 loss in ESG score. Since the mean 'risk' variable is 1.043 with a standard deviation of 2.25, a firm's percent of debt plays a large factor in its ESG score. It's difficult to say whether or not the firm is in debt because they aren't investing in socially responsible practices or they simply do not have enough capital to invest in sustainable infrastructure; in reality - it's likely a combination of the two. Revenue, on the other hand, has a significantly positive impact on

ESG score: for each additional 1 billion SEK earned, a firm's ESG score increases .751, which is right in line with the 'Loose Change' theory.

As imperfect as stock markets might be, at times, they mimic human nature, acting as proxies for our behavior patterns. Smaller firms are much less willing to invest in top-notch ESG practices, for whatever the reason - be it capital restrictions, lack of internal regulatory structure, or fewer employees. Just as we are told on airplanes to "adjust your mask before helping others" - as a firm gains more capital and they become less risky to invest in, then they shift their focus to improving aspects of their company beyond their financial statement. Firms, like humans, act selfishly, until they have sure footing; they will not put climate or workers' rights first unless an external regulatory environment pushes them to change earlier. Seeing how ESG scores have been increasing ~1.5 points each year for the Swedish firms analyzed in this paper - perhaps due to Sweden's increasing environmental regulations - one can only hope this trend continues faster than the rate of earth's rising temperatures.

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Dependent Variable	*Explanation*
TR	Natural logarithm of total return of a stock (assuming dividends reinvested)

Independent Variable	*Explanation*
ESG	Environmental, Social, & Governance score calculated by Thomson Eikon

Control Variables	*Explanation*
Year	Year of returns (systematic risk)
Debt	Firm's total debt (billions of SEK)
Revenue	Firm's revenue from that fiscal year (billions of SEK)
Total Assets	Firm's total assets (billions of SEK)
Cash Flow	Firm's cash flow (billions of SEK)
R & D	R&D expenditure (billions of SEK)
Innovation	R&D/Total Assets
Risk	Debt/Total Assets

Table I.
Variables

	Mean	SD	Minimum	Maximum
Dependent Variable				
TR (ln)	-1.683	1.181	-6.965	1.249
Independent Variable				
ESG	64.400	18.226	3.934	95.131
Control Variables				
Year	2014.5	3.455	2009	2020
Debt (bill)	15.20	43.10	0	290.00
Revenue (bill)	9.180	12.10	-2.190	81.30
Total Assets (bill)	49.70	127.0	0.112	908.0
Cash Flow (bill)	1.62	2.890	-2.920	27.7
R&D (bill.)	1.49	2.43	.00363	11.6
Innovation	.0633	.0626	.001	.246
Risk	1.043	2.248	-1.117	20.233

Table II.
Descriptive Statistics

Variables	Correlation Coefficient (Standard Error)			
	Equation I	**P-Value**	**Equation II**	**P-Value**
ESG_{-1}	-.004 (.008)	.602	-	-
TR_{-1}	-	-	-.405 (.751)	.591
Year	-.004 (.031)	.907	1.530 (.280)	0.000***
Debt	.0603 (.0587)	.306	.0425 (.424)	.920
Revenue	-.0047 (.0192)	.804	.751 (.151)	.000***
Total Assets	-.0198 (.0176)	.262	-.188 (.158)	.235
Cash Flow	.0738 (.0587)	.210	.791 (.576)	.171
R & D	.0178 (.235)	.940	.4593 (2.70)	.865
Innovation	1.689 (5.455)	.757	14.005 (58.467)	.811
Risk	-.229 (.561)	.683	-21.871 (4.757)	0.00***
R^2 (adj)	.034		.5288	
Observations	153		153	

Table III.
Regression Results