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Indexing for ESG Performance: Corporate Governance

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Abstract

This research investigates the procedure of combining passive investment through index tracking with socially responsible investment and its effects. The passively managed Good Governance Index was created using the data on corporate governance of the S&P 500 index's constituents from 2008 to 2016 and straightforward rebalancing methods. The findings show that the Good Governance Index had a higher annualized return than that of its benchmark index from 2010 to 2018. It also had tracking errors of less than one percent over the same period. Moreover, the study suggests that the growth of passive ownership does not downgrade the governance standards of firms in the S&P 500 index. The results of this paper provide institutional investors with a simple and cost-efficient approach to incorporate socially responsible investment into their portfolio.

Keywords: socially responsible investment (SRI), corporate social responsibility (CSR), ESG, corporate governance, passive index, tracking error minimization, institutional investors

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1. Introduction

Institutional investors, such as pension funds, insurance companies, endowments, foundations, etc. have rapidly expanded nowadays, holding positions in almost every asset class, in every sector and region in the world. These universal investors possess significant share of the market, and they constantly look for investment opportunities with attractive risk-adjusted returns. As many active mutual funds fail to provide better returns than the market, investors have shifted to passive investment approach. According to the PwC's Asset & Wealth Management Revolution report, global passive assets will grow from $14.2 trillion in 2016 to $36.6 trillion in 2025 (PwC, 2017). The consultancy firm also predicts that the growth rate of passive investment will be much higher than that of the active counterpart.

While searching for good returns, institutional investors are also increasingly under pressure from the public and their stakeholders to perform well on the environmental, social and governance (ESG) aspects. Due to ethics concerns, many investors are reducing or removing the number of securities in sectors such as nuclear weapon, tobacco, gambling, etc. from their holdings. The investment amount in companies and projects that contribute to the United Nation's Sustainable Development Goals have also increased rapidly over years. Another motivation for investors to invest in firms with good corporate social responsibility (CSR)[1] activities is to avoid the decline of equity value when companies are involved in adverse ESG events (Karpoff, Lott, & Wehrly, 2005; Krüger, 2015). According to a survey by Global Sustainable Investment Alliance, the proportion of responsible investments to the total asset under management in Asia, Australia, New Zealand, Europe and North America has grown to a substantial amount, reaching a record of 26% in 2016 (GSIA, 2017).

Traditionally, investors have implemented their ESG ambitions by excluding companies that do very poorly on these issues, or allocating more capital to the outperformers. But these active approaches would take the portfolio composition away from the market composition. As a result, the tracking error, which is the return differences between a portfolio and its benchmark index, would increase.

At first glance, the passive portfolio investment and ESG goals seem to be incompatible. However, there are researchers and fund managers who believe that it is possible to create stock

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[1] ESG, CSR and SRI are used interchangeably in this paper

market indices that do well on ESG aspects yet have low tracking errors relative to the leading indices that passive investors use. This master's thesis will attempt to solve this contradiction by answering the two central research questions:

> 1. ***Do SRI products improve the returns of institutional investors' portfolios?***
> 2. ***What is the most effective method to engage in responsible investment?***

A considerable number of researchers have conducted studies to answer these questions, yet the results are still inconclusive. To respond to the first question, Derwall, Guenster, Bauer, and Koedijk (2005), Eccles, Ioannou, and Serafeim (2014), Kempf and Osthoff (2007), and Statman and Glushkov (2009) show that funds or portfolios that consist of firms with strong ESG focus outperform the market. Other researchers provide a more neutral view that SRI funds do not perform significantly different from conventional funds (Bauer, Koedijk, & Otten, 2005; Renneboog, Ter Horst, & Zhang, 2008b; Revelli & Viviani, 2015; Statman, 2000). In contrast, Bénabou and Tirole (2010), Masulis and Reza (2014), and Riedl and Smeets (2017) argue that investors bear some costs when they invest in companies with good CSR practice.

Once the investors decide that they want to include responsible investment products in their portfolios, they can choose to actively select the stocks and engage in the management of the companies, or passively invest in index funds. While Dimson, Karakaş, and Li (2015) and Hoepner, Oikonomou, Sautner, Starks, and Zhou (2018) support the idea that active strategy with SRI portfolio can generate abnormal profit for investors, Andersson, Bolton, and Samama (2016) and Chen & Scholtens (2018) show that such active SRI funds do not outperform the passively managed counterparts. Since most institutional investors lack adequate expertise to maintain an active portfolio, many choose to invest in the passive index with the goal to achieve risk-adjusted performances that are similar to the market. This translates to building passive indices that match the returns and at the same time provide low tracking errors from the parent indices.

In practice, many index providers have developed indices that cater to such demands of institutional investors. Their products range from funds that focus on ESG factors in general such as the MSCI ESG Index family, STOXX Global ESG Index, S&P Dow Jones Sustainability Index Series, etc. to funds that take into account only one aspect of the responsible investment spectrum, such as the MSCI Low Carbon Leaders Index, MSCI Governance Quality Index, etc.

Existing academic literature, however, does not provide much insight into how to establish passive funds with ESG focus and similar returns to those of the benchmark indices. This paper will attempt to fill this research gap by analyzing a few methods to screen the index constituents based on ESG factors and to reweight the remaining stocks to achieve the desired results. The study will act as a proof of concept to show that it is possible to exclude companies that do not perform well on CSR and still attain financial outcomes that are comparable to the market. The author also aims to provide investors with a simple method to replicate the benchmark index without the need for complicated, and in many cases expensive, models or software packages.

Among the three aspect of ESG, the environmental issue has been researched intensively, and thus will not be covered in this study. The social aspect, including topics such as labor relations and gender diversity, is an interesting research area. However, the unavailability of good-quality data on this subject may reduce the potential empirical validity of the results. Since data on firms' governance practice is highly available and corporate governance remains a relevant issue, this factor is selected as the main criteria to create the new responsible passive index, from here called the Good Governance Index.

The results of this study are in line with Andersson et al. (2016), with the Good Governance Index providing similar or better returns than the benchmark index. The author employs two straightforward rebalancing methods which distribute the weights of the excluded stock to all the remaining constituents (Method 1) or to companies in the same industries (Method 2). The two techniques produce similar results, generating tracking errors from 0.06% to 0.23%. The second approach is chosen as the optimal method because it only adjusts the weights of constituents in the same industry with the removed securities, and thus lowers the trading cost for investors. This research demonstrates that an index comprising of only firms that are good at corporate governance can perform similarly to its parent index. The tracking errors of the Good Governance Index is lower than those of the MSCI Low Carbon Leaders Index, MSCI Governance Quality Index, or the STOXX Global ESG Governance Leaders due to several reasons, including different benchmark selection and the total market value of the excluded stocks.

The structure of the paper is organized as follows. In section 2 the relevant literature is reviewed and hypotheses are developed. Section 3 and 4 follow with the description of the empirical

approach and data. The results are presented in section 5, with the discussion, limitations and ideas for future research come subsequently. Finally, this paper concludes by reviewing the overall results.

2. Literature review and hypotheses development

2.1. The relationship between ESG and firm financial performance

2.1.1. The general effect of CSR on financial returns

There are two strands in the literature regarding the relationship between CSR activities and the firm financial performance. On the one hand, studies such as Friedman (2007), Clotfelter (1985) and Galaskiewicz (1997) argue that adopting socially responsible investment strategy may destroy shareholders wealth. Some scholars in this line of thought see CSR as the manifestation of agency problems, arising when the firms' managers gain benefits from such activities at the expenses of the shareholders (Bénabou & Tirole, 2010; Masulis & Reza, 2014). Others believe that responsible investments can create good social impact but investors may still incur costs for engaging in ESG activities. Using an extensive data set from KLD, Krüger (2015) find that investors react slightly negatively to the announcement of positive CSR news. Renneboog et al. (2008b) and Hong and Kacperczyk (2009) show that funds or portfolio that are screened based on SRI factors underperform conventional funds. Riedl and Smeets (2017) also observe that mutual fund investors are willing to accept lower returns for the good causes.

On the other hand, many studies support the view that socially responsible firms can provide satisfactory risk-adjusted returns. More specifically, sustainable mutual funds appear to perform no worse than other mutual funds (Bauer et al., 2005; Renneboog, Ter Horst, & Zhang, 2008a; Statman, 2000). According to Derwall et al. (2005), firms with strong environmental responsibilities can generate positive risk-adjusted excess returns. Similarly, Kempf and Osthoff (2007), Statman and Glushkov (2009), and Eccles et al. (2014) find that portfolios consisting of companies with strong ESG activities outperform portfolios comprising of weak CSR companies. Friede, Busch, and Bassen (2015) conducts a meta-analysis using more than 2000 empirical studies and confirms the positive link between ESG and corporate financial performance. These results hold true in North America, emerging markets and in nonequity assets classes.

2.1.2. The effect of good corporate governance practice on returns

As mentioned above, some investors identify ESG activities as a source of the agency problem. Thus, to gain investors' confidence, it is essential for firms engaging in CSR to have good corporate governance. The CFA Environmental, Social and Governance (ESG) Survey (2017)

shows that 67% of 1,588 respondents take corporate governance into account in investment analysis or decisions, making it the most common among the three ESG themes. Specifically, 74% respondents who work for institutional investors consider governance in the investment process, compared to only 51% of respondents who work for private investors. Most notably, Gompers, Ishii, and Metrick (2003) find evidence that U.S. companies with higher shareholder rights achieve better returns during the 1990s. L. Bebchuk, Cohen, and Ferrell (2008) also find that possessing some takeover defense mechanisms, which are considered to be harmful to shareholders' rights, negatively affects firms' abnormal return during the period 1990-2003 in the US. In addition, Bhagat and Bolton (2008) and Brown and Caylor (2009) show that good governance leads to better operating performance but not future stock market returns. On the global level, Malik and Makhdoom (2016) find a strong positive relationship between corporate governance and firm performance. Studies such as Bauer, Guenster, and Otten (2004) and Narayan, Sharma, and Thuraisamy (2015) suggest that corporate governance is significantly associated with positive abnormal stock returns only in countries with poor governance standards. In line with these findings, other researchers find a positive relationship between corporate governance and firm valuations or performance in Latin America (Bebczuk et al., 2007), New Zealand (Reddy, Locke, Scrimgeour, & Gunasekarage, 2008), China (Liu, Miletkov, Wei, & Yang, 2015), India (Mishra & Mohanty, 2014), etc.

Despite the strong support from the aforementioned studies, the positive relationship between good corporate governance and firms' performance and valuation remains a controversial topic. Bruno and Claessens (2007), Chhaochharia and Grinstein (2007) and Gillan, Hartzell, and Starks (2003) argue that the cost of implementing such mechanisms may outweigh the benefits. Core, Guay, and Rusticus (2006) investigate the findings of Gompers et al. (2003) and finds no support for the casual relationship between weak governance and poor stock returns. L. A. Bebchuk, Cohen, and Wang (2013) show that during the period 2000-2008, firms' good governance practice was no longer associated with abnormal returns. The disappearance of the governance-return relationship is explained by the fact that market players have learned to appreciate the benefits of getting good corporate governance scores. The authors also observe that the attention from the media, institutional investors and researcher has increased dramatically since the beginning of the 2000s. Therefore, governance remains relevant for research and in practice. Based on the discussed literature, the first hypothesis is formulated as follows:

> ***Hypothesis 1:*** *The passively managed Good Governance Index, which comprises constituents that have good corporate governance practice, can generate returns similar to or better than those of the benchmark index.*

2.1.3. What is important in corporate governance?

Research has shown that not all corporate governance aspects have an impact on firms' performance. This section will examine more closely which governance metrics are important from the investors' perspective. The most crucial provisions will be used when screening for the constituents of the Good Governance Index.

Firstly, the board of directors plays a vital role in improving and maintaining the governance quality of the company by monitoring performance, providing advice to the CEO, connecting with the external stakeholders, etc. One of the crucial metrics contributing to the board quality is the meeting attendance rate. Failure to attend meetings may affect the ability of directors to exercise judgments on key issues (Jiraporn, Davidson III, DaDalt, & Ning, 2009). In addition, Lin, Yeh, and Yang (2014) find that firms with higher board meeting attendance rates have better accounting performance since they receive more board supervision.

The relationship between the board structure and the firm performance is also a highly debated topic in the corporate governance literature. Although the presence of independent directors on the board may improve governance, there is mixed evidence that such board composition correlates with the firm financial performance (Fuzi, Halim, & Julizaerma, 2016). Hermalin and Weisbach (1991) find no relation between the proportion of independent directors and firm performance, using a sample of 134 firms listed on NYSE. Bhagat and Black (2001) conduct a large sample with a long time horizon study of large American firms and finds no relationship between the degree of board independence and long-term financial performance. In contrast, a meta-analysis done by Rhoades, Rechner, and Sundaramurthy (2000) shows that board composition has a small positive correlation with firm performance. During the Great Financial Crisis 2007-2008, in G8 countries, the large institutions with more independent directors on auditing and risk committees have better financial performance (Yeh, Chung, & Liu, 2011). Besides, US public firms that do not comply with the requirement of 100 percent independence of compensation committee may not perform as well as otherwise comparable firms (Lee, Bosworth, & Kudo, 2016). The literature suggests that while board independence has mixed

effect on performance, the independence of committees such as auditing, risk, and compensation may create positive influence.

Another aspect of the board composition that can have an impact on governance is the formation of the CSR committee. There are many studies which show that corporate social activities can create an agency problem between the firm management and shareholders, such as Barnea and Rubin (2010), Masulis and Reza (2014), etc. Greening and Gray (1994) suggest that establishing a committee to administer CSR activities may improve both social and financial performance.

Board diversity, especially the gender equality, is another important topic in corporate governance. Amongst other goals, the United Nation's Sustainable Goals emphasizes that women should be given "full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic and public life" (Assembly, 2015). Having more women on the board does not only fulfill the social goal but also improve the firm's financial outcomes. A meta-analysis of 140 studies by Post and Byron (2015) finds that female board representation has a positive correlation with the board responsibilities such as monitoring and strategy involvement. The paper also shows that in countries with strong gender parity, stock market performance is positively related to the inclusion of female directors on the board.

In the article "What matters in Corporate Governance?", L. Bebchuk et al. (2008) points out that staggered board, or classified board, has an adverse effect on firm valuation and stock returns. Other takeover defense mechanisms that have the similar influence on firm performance are limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendment. These findings are in line with Bizjak and Marquette (1998), L. A. Bebchuk and Cohen (2005), Davidson III, Pilger, and Szakmary (1998), etc. The limited shareholder rights issued is further investigated by Masulis, Wang, and Xie (2009). Using a sample of U.S. dual-class companies, the authors show that the separation between voting rights and cash flow rights increases the agency problem and diminishes the firms' market value.

From the agency perspective, CEO duality can create a conflict of interest when the CEO holds both managing and supervising positions (Finkelstein & D'aveni, 1994). There are mixed findings on whether CEO duality can affect the firm performance, with research such as Daily and Dalton (1994) and Worrell, Nemec, and DAVIDSON III (1997) support the negative

relationship, while Boyd (1995), Baliga, Moyer, and Rao (1996) and Krause and Semadeni (2014) find a negative or null relationship. Dalton and Dalton (2010) mention CEO duality as one of the "contemporary, and intensely contentious issues related to the governance of publicly traded companies" (p.405).

In line with these academic findings, major CSR rating agencies and index providers such as MSCI also employ many mentioned provisions in their search criteria for companies with good governance practice. These provisions include Qualified Auditor Opinion, Audit Committee Independence, Compensation Committee Independence, Gender Diversity, Independent Chair, Annual Director Elections, etc.

2.2. The rise of index investing

Investors can integrate ESG criteria into their investment strategies either by actively selecting portfolio comprising of firms performing well on the relevant aspects or creating passive SRI indices based on market benchmarks. Traditionally, many investors choose the former with the belief that by holding stocks of socially responsible companies, they can avoid certain regulation and reputation risks, leading to a premium over market returns. A survey sent to 251 fund managers under TKP Investment in the Netherlands found that ESG integration is similar to traditional active management based on fundamental investing (van Duuren, Plantinga, & Scholtens, 2016). Studies such as Dimson et al. (2015) and Hoepner et al. (2018) suggest that active investing with ESG focus is profitable for investors.

However, when cost is taken into account, the active strategy may not provide positive results as expected. Using the data for mutual funds from 1984 to 2006, Fama and French (2010) find that few active mutual fund managers had enough skill to cover their costs. Furthermore, the average cost of active investing during the period 1980-2006 is 0.67% of the aggregate value of the market each year (French, 2008). Resonating with these findings, Andersson et al. (2016) show that from 2007 to 2014, a number of pure-play green indices underperformed standard benchmarks such as S&P 500 and NASDAQ. In the US, Chen and Scholtens (2018) find that SRI active funds do not outperform their passive counterparts, and suggest that passively managed social responsible funds may have the potential to contribute to the sustainability integration by expanding the financial products spectrum.

As active SRI funds fail to deliver superior returns to compensate for their high costs and risks, investors have turned to passive indices. This approach takes a standard benchmark and removes or under-weights firms with low ESG scores. According to Moody's research, passive funds account for 29 percent of the U.S. financial market in 2017. The credit rating company also expects that passive investment will surpass the active approach between 2021 and 2024 (Hunnicutt, 2017). There is ample evidence that returns of index funds are higher than their parent indices. Index funds such as iShare S&P 500, BlackRock's Consensus 85, Vanguard LifeStrategy fund family, FTSE trackers have consistently outperformed their benchmark (Ellis, 2017). Frino and Gallagher (2001) study a sample of 42 S&P 500 index funds and shows that passively managed funds outperform their active counterparts after taking fees into account. Andersson et al. (2016) and Merz, Janus, and Wojtowicz (2016) findings support the view that SRI index funds perform as well or better than active responsible funds.

Besides returns and costs factors, institutional investors such as pension funds may choose to invest in the passive index as they do not have the expertise to manage active portfolios. Results from the CFA ESG survey show that in 2017, only 37% of respondents from institutional investors said that there were employees receiving training on how to integrate ESG into the investment decision-making process. In addition, institutional investors with long-term focus also preferred to hold shares of the index funds that closely track the benchmarks because such indices might give them more stable returns and less volatility compared to the active portfolios.

2.3. Passive ownership and corporate governance

The exponential growth of passive investing has posed a question regarding its effect on corporate governance. The passively invested funds are criticized for lacking the will and the necessary resources to monitor their diverse holdings. Due to the long holding horizon, such funds also do not have the power of exit or the selling of shares when companies perform poorly (Appel, Gormley, & Keim, 2016). Schmidt and Fahlenbrach (2017) show that an exogenous increase in passive ownership leads to higher agency cost. DeLisle, French, and Schutte (2017) and Sushko and Turner (2018) show that passive ownership leads to decreased price informativeness and increased correlation between securities. There are also concerns that a more passive strategy means there are fewer boardroom activists, resulting in less movement toward more sustainable business.

The problem is amplified by the fact that the passive fund industry is highly concentrated, with the "Big Three" (BlackRock, Vanguard, and State Street) accounting for over 90% of the market share. Though the "Big Three" do vote at most shareholder meetings, there is evidence that they utilize coordinated voting strategies, and often vote with the management (Fichtner, Heemskerk, & Garcia-Bernardo, 2017). However, Larry Fink, CEO of BlackRock, argues that since they cannot sell the shares, the indexers have a strong motivation to be involved with companies. BlackRock has used the stewardship method for communicating with firms management (Authers, 2015). Fichtner et al. (2017) also note that big passive investors can exert their influence via private engagements, which may not be known to the public. Appel et al. (2016) argue that passive ownership is associated with better corporate governance in terms of more independent directors on a board, fewer takeover defenses, equal voting rights, etc. They observe that passive institutions use their large voting blocs to exercise voice and support shareholder-initiated governance proposal.

2.4. Building an SRI index fund with low tracking error

2.4.1. Tracking error definition:

As the primary purpose of creating the SRI index fund is to minimize the tracking error, it is essential to understand the concept and factors that affect such variation in index performance. By definition, tracking error is the returns differences between a portfolio and its parent index. Since tracking error is significantly correlated with index revision, spin-off, index replication strategy, fund size, etc., this type of error is unavoidable for passive funds (Frino, Gallagher, Neubert, & Oetomo, 2004). This puts index fund managers under pressure of minimizing the cost incurred in imitating the benchmark index returns as closely as possible and at the same time reducing the tracking error (Frino & Gallagher, 2001).

Frino and Gallagher (2001) summarize some popular methods to calculate tracking error that were presented by Roll (1992), Pope and Yadav (1994) and Larsen and Resnick (1998). Tracking error can be calculated as the absolute difference between the return of index fund and its benchmark index

$$e_{pt} = R_{pt} - R_{bt} \tag{1}$$

Where

R_{pt} = return of the index fund

R_{bt} = return of the benchmark index

Using this method, the monthly average absolute tracking error over n months is

$$TE_{1,p} = \frac{\sum_{t=1}^{n}|e_p|}{n} \qquad (2)$$

Alternatively, tracking error is the standard deviation of the difference in returns between the index portfolio and its parent index. This model is often referred to as the quadratic model.

$$TE_{2,p} = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(e_{pt} - \bar{e}_p)^2} \qquad (3)$$

In the last methods which Frino and Gallagher (2001) uses, tracking error is quantified as the standard error of the residuals when regressing the returns on the index fund *p* on the returns of the benchmark index *b*

$$R_{pt} = \alpha_i + \beta_i R_{bt} + \varepsilon_{pt} \qquad (4)$$

In another line of research, Rudolf, Wolter, and Zimmermann (1999) proposes four linear tracking error models

$$TE_{MAD} = \min_{\beta} l'(|X\beta - Y|) \qquad (5)$$

$$TE_{MADD} = \min_{\beta} l'(|\bar{X}\beta - \bar{Y}|), \text{ where } \bar{X}_t\beta < \bar{Y}_t \qquad (6)$$

$$TE_{MinMax} = \max_{t}|X\beta - Y| \qquad (7)$$

$$TE_{DMinMax} = \max_{t}|\bar{X}\beta - \bar{Y}|, \text{ where } \bar{X}_t\beta < \bar{Y}_t \qquad (8)$$

Where

X = the matrix of continuously compounded returns on n assets

Y = the vector of continuously compounded benchmark returns

β = the portfolio weights to be determined

According to Rudolf et al. (1999), such linear models have several advantages over the quadratic model as fund managers often think of linear deviations, not quadratic deviations, between the index fund and the benchmark performance. Portfolio managers are also typically rewarded by linear performance fees.

2.4.2. Prior studies on minimizing tracking error

There is a large body of literature on portfolio optimization to reduce tracking errors of index funds. D'Urso, Cappelli, Di Lallo, and Massari (2013) use the quadratic model to develop a time series cluster analysis approach to decide which particular stocks should be included in the index portfolio, up to a prespecified number. They used a weighting parameter lambda for the tradeoff between tracking error and excess return to calculate the capital investment in each stock. Though computational results are presented, no time horizons are given. Jorion (2003) suggests that adding a constraint on the total portfolio variance to the quadratic model can improve the mean-variance efficiency of the portfolio.

Other studies use the quadratic model and attempt to develop a more comprehensive and sophisticated optimization to solve the tracking error problem. Shapcott (1992) uses generic algorithms to select the optimal subset of securities and quadratic programming to find their performance and the proportion of capital that should be invested in each stock. The two steps are done separately. Building on this method, Ruiz-Torrubiano and Suárez (2009) create a hybrid optimization which is able to identify quasi-optimal tracking portfolios with less computational cost. Some researchers also use heuristic algorithms to deal with the complexity of the tracking error problem. Beasley, Meade, and Chang (2003) create an evolutionary heuristic which takes into account transaction costs and portfolio rebalancing while minimizing tracking error. Gilli and Këllezi (2002) also use a heuristic algorithm to reduce tracking error with transaction costs. In the recent years, with the advanced technology development, the computation power of the computer is employed to develop more complicated tracking error models, such as in Canakgoz and Beasley (2009), C. Chen and Kwon (2012), Li, Sun, and Bao (2011), etc.

With regards to SRI tracking index, Andersson et al. (2016) favor the index construction approach which aims to minimize the tracking error subject to meeting a corporate governance threshold over the method that first imposes a constraint on the tracking error and then screens the index constituents to maximize the governance scores. Using a similar approach, Milevsky,

Aziz, Goss, Comeault, and Wheeler (2006) remove stocks with lowest CSR rating and reweight the index components with a portfolio replicating algorithm. The authors achieve an SRI-screened portfolio that closely mimics the performance of the S&P/ TSX 60 index. In line with these studies, Jennings and Martin (2007) demonstrate how to use commercial software to construct customized SRI index at a low cost.

2.4.3. *Performance and tracking errors of current ESG indices in the market*

As mentioned in section 2.2, passive index funds have increased rapidly recently. This section will summarize the performance of some notable SRI passive indices. Tracking the S&P 500 index, the S&P 500 Carbon Efficient Select Index aims to reduce the carbon footprint of the overall portfolio by excluding 20% of the stocks with the highest carbon intensity (CO_2 / Sales). The weights of stocks removed from the S&P 500 are capped at no more than 50% of the original sector weights. The remaining constituents are rebalanced to minimize the tracking error. Compared to its benchmark, the S&P 500 Carbon Efficient Select Index produces less than 50% carbon footprint, with the tracking error of no more than 0.5% (Andersson et al., 2016).

With a somewhat similar methodology, AP4 (the Fourth Swedish National Pension Fund), FRR (the French pensions reserve fund) and Amundi cooperated with MSCI to develop another index family which takes into account not only the carbon emission intensity but also the fossil fuel reserves intensity. The MSCI Low Carbon Leader Index family maintains the country and sector weights of the parent indices while restricts the turn over to be no more than 10% at each review. The remaining index components are also reweighted to minimize the tracking error. As of July 2018, the MSCI Global Low Carbon Leader Index performed similarly to its benchmark, with a tracking error of 0.45% (MSCI, 2018b).

MSCI also creates the Governance-Quality Index family, which comprises of a predetermined number of securities in the benchmark index that have best governance quality scores. The weights of the reamaining constituents are determined by both the original weights in the parent index and the governance scores. The MSCI World Governance-Quality Index has outperformed its benchmark since November 2009. However, it has a high tracking error of 2.99% from the MSCI World (MSCI, 2018a).

STOXX, another popular index provider, also enters the ESG passive funds market with products such as STOXX Global ESG Index and STOXX Global ESG Governance Leaders

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indices. The STOXX ESG indices have outperformed their benchmarks since the inception in 2004. However, they had high year-to-date tracking errors of 7.3% and 7.7% respectively, as of June 2018 (STOXX, 2018a, 2018b). The reasons for higher tracking error compared to the MSCI Low Carbon Leader indices may lie in their methodology. In the index construction process, all companies involved in controversial weapon sectors or those who do not comply with the UN Global Compact Compliance Principles are excluded. Capelle-Blancard and Monjon (2014) find that such sectoral screening can affect the index performance and tracking error. Besides, STOXX Index components are weighted according to their ESG ratings, which is different from the MSCI methodology of preserving the original sector weights in the benchmark index. Such approach may further deviate the behavior of the STOXX Index from their benchmarks.

The cited literature and practical evidence concerning minimizing the index tracking error lead to the second hypothesis:

> ***Hypothesis 2:*** *The exclusion of up to fifty percent of the benchmark index's constituents that have low corporate governance scores will not lead to tracking errors of more than one percent.*

3. Methodology

3.1. Stock selection methods

As discussed previously, passive funds are constructed by removing or underweighting stocks that perform poorly on certain aspects. Hong and Kacperczyk (2009) and Derwall, Koedijk, and Ter Horst (2011) show that securities excluded from such negative screening process may provide better returns for investors. However, this does not mean screening negatively affects financial performance. Capelle-Blancard and Monjon (2014) find that only sectoral screening such as avoiding the nuclear industry or sin stocks hurts financial returns of SRI mutual funds. Transversal screening, which applies to all sectors, does not necessarily reduce diversification and thus does not impair performance.

During the screening process, investors are presented with the options to either exclude or underweight stocks with the worst ESG scores. Specifically, the first technique involves firstly ranking stocks based on their ESG performance. A predefined number of worst performers will be removed, and the remaining constituents will be reweighted to obtain the minimal tracking error. In the second technique, the worst performers' weight in the index will be reduced to achieve the optimal level of sustainability. Although the latter method is more flexible, it has a few drawbacks such as its opacity and the lack of clear signal showing which securities are excluded because of poor ESG performance. The signaling effect can help discipline the excluded firms and facilitate the healthy competition to improve CSR practice (Andersson et al., 2016). This effect also influences financial performance, as Capelle-Blancard and Couderc (2009) find a short-term increase in stock prices around the announcement for being included in the responsible index.

Following the spirit of Andersson et al. (2016), this study will first filter companies based on restrictions regarding corporate governance performance. It will then attempt to minimize the returns variation between the Good Governance Index and S&P 500.

In the dataset containing the governance score of S&P 500's constituents from 2008 to 2016, which will be discussed with more details in section 4 and 5, companies with low scores do not concentrate in any particular industry. Therefore, the transversal screening method mentioned in Capelle-Blancard and Monjon (2014) can be applied. In addition, due to the benefits of the signaling effect, companies with the lowest scores will be completely removed from the

governance index. To explore more systematically the trade-off between improving governance scores and increasing tracking errors, the number of stocks that are removed from the benchmark index will range from 50 to 250, which are equal to 10% to 50% of the total number of index constituents. The stock selection formulation is as follows:

$$\text{Min Tracking error} = \text{std} (R_{G,t} - R_{S\&P,t})$$

Where

$w_j^g = 0$ for j =1….m, with m = 10,…250

$0 \leq w_i^g$ for all i = m + 1, …, N, with N is the number of index constituents

Std = standard deviation

3.2.   Optimizing the tracking error

The purpose of this study is to provide both researchers and finance professional with the insight regarding building an SRI passive index. Thus it will employ the quadratic model of the tracking error, as this is the most popular method among both groups of audiences. Although the models mentioned in section 2.4.3 may provide good tracking error optimizations, they are too complicated for finance professionals to apply in the constantly changing market. Such models also require the data that may not be available to many institutional investors. To overcome this difficutlty, this study aims to show that investors can still achieve a small tracking error using straightforward reweighting techniques. In practice, some service providers have developed software packages to assist investors in reducing tracking error, such as the MSCI BARRA Optimizer, which is built on the famous BARRA factor model. The research findings may be more robust if the researcher can compare the results of this paper with the results obtained from the BARRA Optimizer. However, due to the high cost, such software is not available.

The proposed reweighting method includes two approaches. In the first method, when a stock is removed from the index, its weight will be distributed equally among the remaining securities. The same treatment is applied to stocks that are delisted or removed from the S&P 500 throughout the year. The idea behind this method is to assign equal importance to all stocks in the Good Governance Index. In the second approach, the weight of each industry is preserved by distributing the weights of excluded or delisted securities among the remaining firms in the same industries. If there is only one stock left in the industry, that security will not be removed from

the index. This technique aims to limit the systematic risk by targeting sector weights that reflect the weights of the benchmark index.

For each year k, the constituents list was extracted from Bloomberg at the end of December, and the governance score for each firm in year k-1 were obtained from Bloomberg and ASSET4. The tracking error between the governance index and the S&P 500 index was computed using weekly returns of the two indices in year k+1. The weekly returns on the Good Governance Index are the weighted average returns of stocks in the index, with the weights obtained from the two aforementioned reweighted methods. More details on such data will be discussed in section 4.

The research problem is then represented as:

$$\text{Min Tracking error} \quad = \text{std} \, (R_{G,t} - R_{S\&P,t}) \qquad\qquad (9)$$

$$= \text{std} \, [\, \textstyle\sum_{i=m+1}^{N}(w_{i,t}^{g} * r_{i,t}) - R_{S\&P,t}]$$

Where

$w_{i,t}^{g}$ = weight of stock i in the Good Governance Index at week t

$r_{i,t}$ = log return of stock i in the Good Governance Index at week t

$R_{S\&P,t}$ = log return of the S&P 500 index at week t

4. Data

4.1. Corporate governance scores

The S&P 500 was chosen as the benchmark index for this study, due to its popularity and the availability of information of the constituents. The constituent lists from 2009 to 2017, including ISIN codes and GICS industry codes, were obtained from Datastream once a year on the last trading day. For each constituent, data on corporate governance practice was collected using information from Bloomberg and ASSET4. Though both Bloomberg and ASSET4 provide ratings on governance, such rankings may not be reliable. Each rating agency has different understandings of the concept of CSR. They also do not communicate the method of assigning scores clearly the public (Bendell, 2010). In addition, firms that are included in the rating universe may attempt to influence the evaluation (Meyer & Gupta, 1994). Thus the overall ESG rankings may not be as objective as expected. Furthermore, if scores from different rating agencies for one company contradict one another, it is difficult for investors or researchers to decide which number is more reliable.

In order to overcome this problem, instead of taking the overall scores provided by Bloomberg and ASSET4, the author selected nine corporate governance provisions for each index constituent. The criteria for the metrics to be chosen are the importance in the research literature, the level of subjectivity and the availability of data. When data on one metric of a firm is missing, the author will conduct an online search in its annual report, proxy statement, and news articles to find the information. If there is no information available, the company will be assigned a score based on the performance of other firms in the same industry. This relies on the assumption that firms in the same industry will have similar corporate governance policy. The selected governance metrics are shown in Table 1.

Since the information on corporate governance of many firms in year *k* is only reported in year *k+1*, the governance score lags one year after the constituents list. For example, the index components at the end of the year 2009 will be evaluated based on their governance scores in 2008. Once all the individual scores are obtained, the index constituents are ranked based on the total scores. If several firms have the same overall scores, they will be sorted based on the Bloomberg governance disclosure score and the percentage of free float share. This approach will prevent the arbitrage problem when removing securities with the same total scores.

Table 1: Important corporate governance provisions

This table displays the important governance metrics that will be used in the screening process to build the Good Governance Index. These provisions are selected based on their importance in the research literature, the level of subjectivity and the availability of data.

Corporate governance provisions	Score	Description	Source
Board meeting attendance percentage	Score higher than 75 = 1, Otherwise = 0	Did all board members attend at least 75% of board meetings?	Bloomberg
Gender diversity	Yes =1, No = 0	Board has at least 1 female director	Bloomberg
Classified board	Yes = 0, No = 1	Are board members re-elected annually?	Bloomberg
CEO duality	Yes = 0, No = 1	Is the CEO also the Chairman of the board / President?	Bloomberg
Equal voting rights	Yes = 0, No = 1	Does the company have dual class unequal voting rights?	Bloomberg
Golden parachute	Yes = 0, No = 1	Does the company have severance payment policy?	ASSET4
CSR committee	Yes =1, No = 0	Does the company have a CSR committee?	ASSET4
Audit committee independence	Score equal to 100 =1, Otherwise = 0	Percentage of independent board members on the audit committee	ASSET4
Compensation committee independence	Score equal to 100 =1, Otherwise = 0	Percentage of independent board members on the compensation committee	ASSET4
Governance disclosure score	-	Bloomberg's ratings of companies based on their disclosure of corporate governance policies	Bloomberg
Free float share (%)	-	Percentage of outstanding shares trading on the market	Bloomberg

4.2. Constituents' weights and index returns data

Ideally, the weights of each constituent in the S&P 500 on the last trading day of each year should be obtained and used as the basis for computing the weights of firms in the Good Governance Index. However, the cost of such historical data of the S&P 500 Index is beyond the budget of a master thesis. Thus the author calculated the weights of each stock on the last trading

day using the free float market capitalization, following the methodology provided by S&P Dow Jones Indices as follows:

$$\text{The original weight of stock l in the S\&P 500 index: } W_l = \frac{FM_l}{\sum_{l=1}^{N} FM_l} \qquad (10)$$

Where

FM_l = free float market capitalization of stock l of the S&P 500 on the last trading day

N   = number of S&P 500 index constituents

As discussed above, tracking error is the differences in returns of an index fund and its parent index. The total return index of the individual constituents and the S&P 500 itself were obtained from Datastreams. The returns of each stock and the benchmark index are the natural log of the total return index.

The S&P 500 is revised quarterly in March, June, September, and December. The measurement of tracking error would be more accurate if the Good Governance Index is also rebalanced every quarter. However, such rebalancing is beyond the scope of this thesis. Instead, the Good Governance Index will be rebalanced once a year. Stocks that were dead or removed from the parent index will be excluded from the governance index immediately. However, the new addition to the parent index will only be incorporated into the tracking index at the next revision. The low rebalance frequency may affect the tracking error calculation. This limitation will be discussed in a later chapter.

5. Results

5.1.   Returns of the Good Governance Index

To test the first hypothesis, annual returns of the Good Governance Index were computed using the weekly returns. As mentioned in section 4, the data on index returns lags one year after the index constituent lists. Thus the returns are calculated from 2010 to 2018[2]. Table 2 displays the performance of the benchmark index and the Good Governance Index using two rebalancing methods when 250 stocks, or 50% of the constituents, were removed.

Table 3: Returns of the Good Governance Index from 2010 to 2018

This table displays the returns of the S&P 500 and the Good Governance Index using 2 methods of reblancing. Data on index returns lags one year from the index formation date. Data on returns in 2018 is up to and including May 2018.

Year of index formation	Year of returns	Annual returns		
		Benchmark	Method 1	Method 2
2009	2010	14.00%	14.58%	15.24%
2010	2011	1.29%	7.67%	7.79%
2011	2012	14.84%	13.87%	14.76%
2012	2013	34.11%	33.70%	34.19%
2013	2014	15.76%	16.96%	17.19%
2014	2015	0.44%	-2.75%	-1.90%
2015	2016	11.57%	15.97%	14.49%
2016	2017	21.90%	21.07%	19.96%
2017	2018	-0.04%	1.90%	2.10%
Annualized returns		12.17%	13.22%	13.33%
Standard deviation of returns		10.56%	10.09%	9.94%

The findings show that neither the Good Governance Index nor the S&P 500 Index consistently outperformed the other over the studied period. It is worth noting that in times of increasing market volatility, such as in 2009 and 2010 or the first half of 2018, using the second method, the former outpaced the latter by 1.24%, 6.5%, and 2.14% respectively. The tracking index also had

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[2] Data for 2018 is available from January up to and including May

higher annualized returns with a lower standard deviation than the S&P 500. Thus the first hypothesis is supported.

5.2.   Tracking errors of the Good Governance Index

Table 3 displays the tracking errors of the Good Governance Index over the period from 2010 to 2018. The results in Panel A were obtained from the first method, in which the weights of the excluded stocks were distributed equally among the remaining constituents, while the results in Panel B were generated by distributing such weights to only companies in the same industries as the excluded ones.

Generally, as more stocks were removed, the tracking errors of the Good Governance Index increased. In both methods, the tracking errors range from 0.06% to 0.23%. The differences were highest in 2011, 2015 and 2016. Looking at the last column of Table 3, even when half of the S&P 500 constituents are excluded, the tracking error is still less than 1%. Thus hypothesis 2 is supported for the period from 2010 to 2018.

There is no clear pattern concerning the magnitude of the tracking errors and the number of stock to be removed for the tracking error to peak. This can be seen in Figure 1, which presents the changes of tracking errors when more stocks are excluded in four years: 2012, 2014, 2016 and 2018. When the first 20% of the constituents were removed, the tracking error increased significantly. Subsequently, it can surge, rise modestly, be flat or even decrease slightly. In all cases, both rebalancing methods produced similar results.

Table 5: Tracking errors of the Good Governance Index from 2010 to 2018

This table displays the tracking errors over the period from 2010 to 2018. The results in Panel A are obtained from the first method, in which the weights of the excluded stocks are distributed equally among the remaining constituents, while the results in Panel B are generated by distributing such weights to only companies in the same industries as the excluded ones. The data on tracking error lag one year from the index formation date. Data on tracking error in 2018 is only available until May 2018.

Year of index formation	Year of tracking error	Number of stocks removed				
		m = 50 (10%)	*m = 100* (20%)	*m = 150* (30%)	*m = 200* (40%)	*m = 250* (50%)
Panel A: Distribute the weights equally						
2009	2010	0.0914%	0.1027%	0.0997%	0.1163%	0.1156%
2010	2011	0.1758%	0.1980%	0.2112%	0.2074%	0.2188%
2011	2012	0.0901%	0.1281%	0.1337%	0.1492%	0.1513%
2012	2013	0.0661%	0.0877%	0.0881%	0.0943%	0.1281%
2013	2014	0.0727%	0.1008%	0.0932%	0.1362%	0.1489%
2014	2015	0.1167%	0.1346%	0.1433%	0.1759%	0.2241%
2015	2016	0.1237%	0.1527%	0.1812%	0.2183%	0.2305%
2016	2017	0.1106%	0.1610%	0.1537%	0.1544%	0.1595%
2017	2018	0.0644%	0.1690%	0.1971%	0.1538%	0.1638%
Average tracking error		0.1013%	0.1372%	0.1446%	0.1562%	0.1712%
Panel B: Distribute the weights to stocks in the same industries						
2009	2010	0.0880%	0.1001%	0.1003%	0.1117%	0.1171%
2010	2011	0.1812%	0.2059%	0.2132%	0.2049%	0.2225%
2011	2012	0.0951%	0.1486%	0.1501%	0.1582%	0.1582%
2012	2013	0.0689%	0.0894%	0.0900%	0.0871%	0.1261%
2013	2014	0.0785%	0.0948%	0.1006%	0.1525%	0.1604%
2014	2015	0.1094%	0.1220%	0.1447%	0.1565%	0.2093%
2015	2016	0.1382%	0.1563%	0.1790%	0.2129%	0.2154%
2016	2017	0.1258%	0.1698%	0.1651%	0.1828%	0.1849%
2017	2018	0.0625%	0.1334%	0.1616%	0.1480%	0.1554%
Average tracking error		0.1053%	0.1356%	0.1450%	0.1572%	0.1722%

Figure 1: Tracking errors increased when more stocks were removed
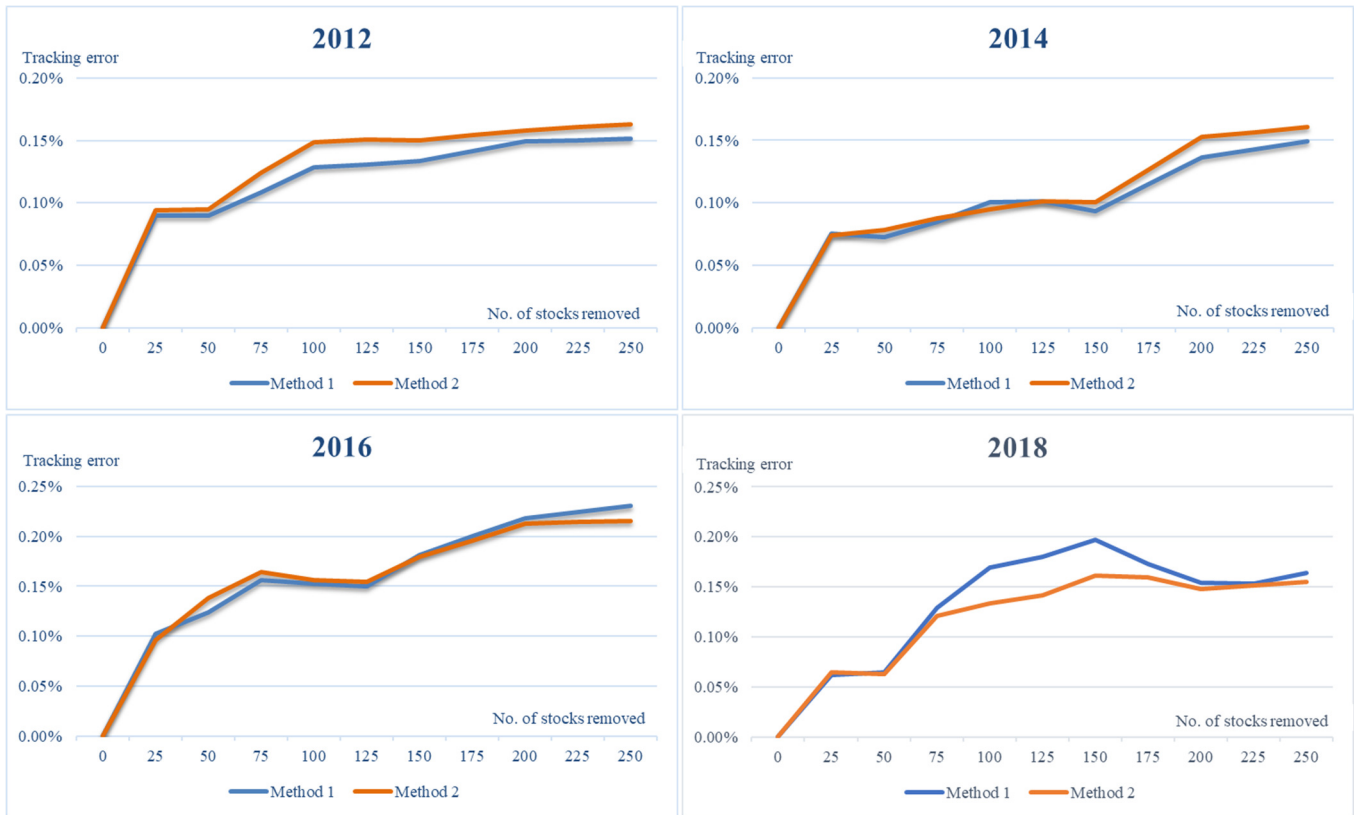
A closer look at the findings when 30% and 50% of the index constituents were removed suggests that the variations between the two approaches are small (Figure 2 and Figure 3). Since Method 2 leads to less index turnover and thus lower costs for investors, it is chosen as the optimal rebalancing strategy in this study. Overall, during the study period from 2010 to 2018, when the 150 and 250 worst performers were removed from the S&P 500, Method 2 produced the average tracking errors of 0.15% and 0.17% respectively.

Figure 2: Tracking errors of the Good Governance Index when 150 stocks were removed
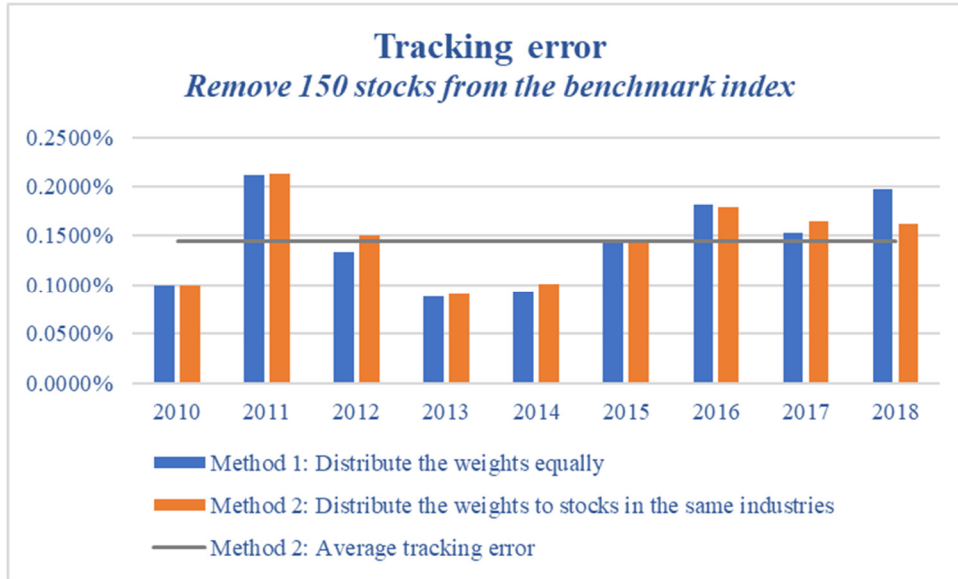
Figure 3: Tracking errors of the Good Governance Index when 250 stocks were removed
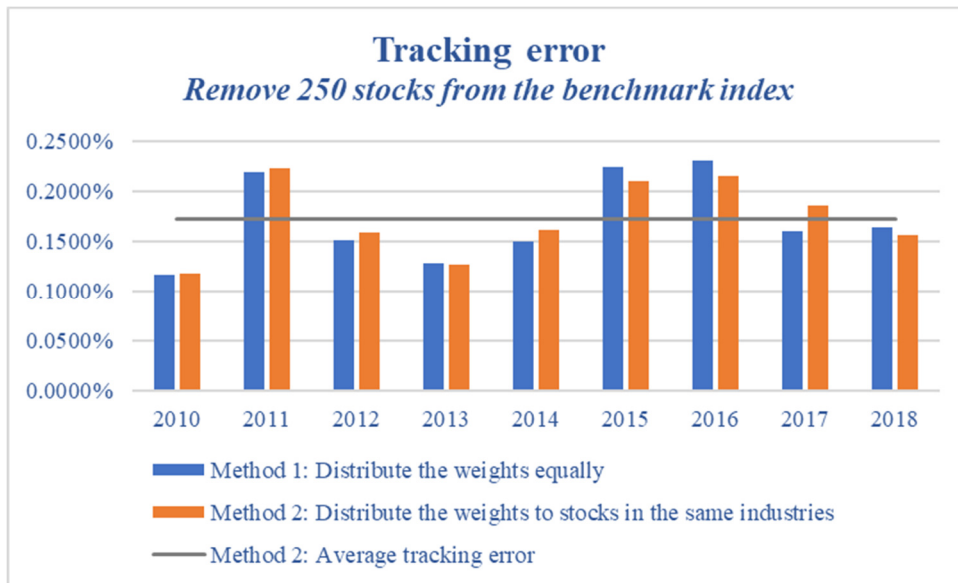
5.3. The impact of passive investing on corporate governance

Besides financial performance, the dataset also provides some interesting insights regarding the corporate governance standards of firms in the S&P 500 during the studied period. In a particular year, a firm can achieve a maximum score of nine points. There were 110 companies getting scores of 5 and below in 2009. This number declined to 33 in 2015 and then increased slightly to 53 in 2017 (refer to Appendix 1). In all nine years, the worst performers did not concentrate in

any industry. In addition, the subset of 20 companies that had the lowest scores also changed over years, with many firms moving up the rankings, such as L3 Technologies, Discovery Series A and C, Michael Kors Holdings, etc.

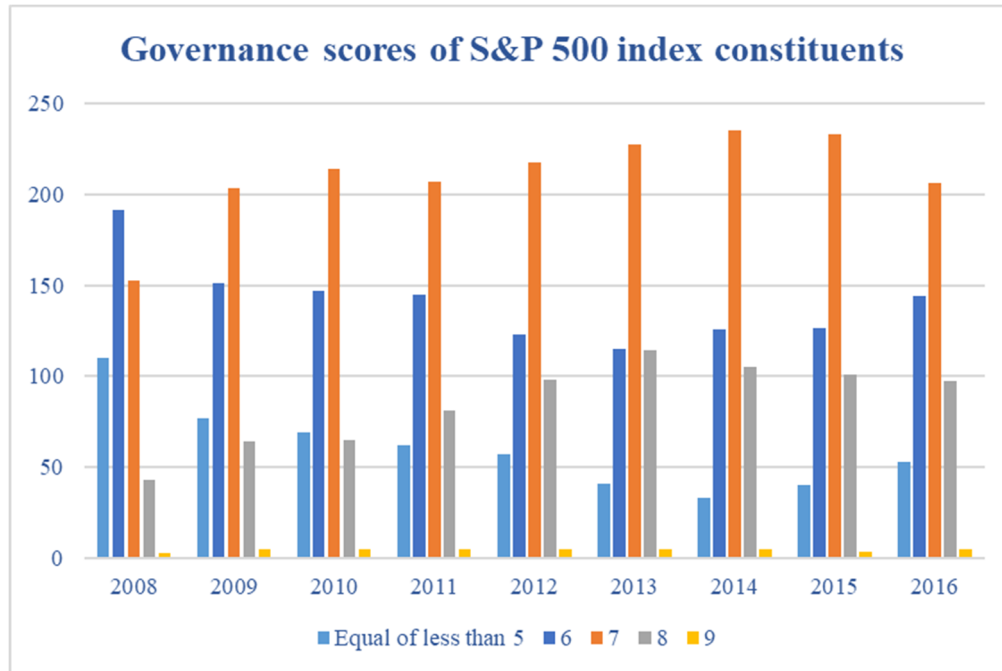*Figure 4: Corporate governance scores of S&P 500 index constituents from 2008 to 2016*

Figure 4 shows the number of companies with scores of 5 and below, and from 6 to 9 for each year of the studied period. The number of firms that have 6 points decreased to the lowest in 2014, then increased marginally. The number of firms with 7 and 8 points also peaked in 2014 and declined slightly afterward. Overall, the governance scores of the S&P 500 constituents in 2016 is higher than that in 2008. These results suggest that the recent development of passive investing does not relegate the corporate governance standards.

The data also shows some changes in different areas of corporate governance. The majority of the index components scored well on board meeting attendance percentage, audit committee, and compensation committee independence. Hence no further analysis is required. The results for the other six metrics, which are different among companies in the index, are summarized in Table 4.

Table 7: Individual governance scores from 2008 to 2016

This table displays the number of S&P 500 constituents that scored 1 in six governance metrics which can differentiate firms. The constituent lists lag one year from the governance data.

Year of index formation	Year of governance data	Gender diversity (Y =1, N =0, count no. of Y)	Classified board (Y=0, N =1, count no. of Y)	CEO Duality (Y =0, N =1, count no. of N)	Golden parachute (N =1, Y = 0, count no. of N)	CSR Committee (Y=1, N=0, count no. of Y)	Equal voting right (equal =1, unequal =0, count no. of equal)
2009	2008	440	323	182	30	179	472
2010	2009	441	327	191	31	309	467
2011	2010	449	327	197	16	331	466
2012	2011	447	347	201	16	343	464
2013	2012	455	365	211	17	349	469
2014	2013	467	405	227	17	345	462
2015	2014	476	429	235	14	320	458
2016	2015	484	436	242	12	284	458
2017	2016	489	434	243	32	283	458

In general, most of the index components performed well on board diversity, classified board, CSR committee, and equal voting rights. The number of companies with at least one woman on their boards increased during the period, with only 16 companies having 0 points for this provision in 2016. There were also more firms with board members elected annually. The number of boards with a CSR committee increased rapidly in 2009, then continued to grow until 2012. From 2013 to 2016, this number decreased by 20%. As the role of the CSR committee is to monitor and report ESG-related activities, the recent trend of using integrated report might explain this decline. Shareholders' voting right equality decreased slightly during the research period, but remained healthy with more than 90% of the index constituents scored one on this metric in 2016.

At the end of the studied period, in more than half of the firms in the S&P 500, the CEOs were still responsible for the activities of the boards. Although many companies progressed in this aspect, there is room for improvement. The governance score summary also shows that the golden parachute policy remains popular in all industries. Despite much research showing the negative effect of such takeover defense mechanism, more than 90% of the index constituents still had some forms of severance payment in 2016.

6. Discussion

The main findings of the paper are to some extent in line with that of Andersson et al. (2016) and Milevsky et al. (2006) in the sense that the tracking errors are below 1% when stocks with low governance scores are removed from the benchmark index. However, it is surprising that the results of this study are much lower than those of the others. In Andersson et al. (2016), when 93 securities (around 20% of the number of constituents) were removed from the MSCI Europe, the passive index had a tracking error of 0.72%. When 20% of the stocks were removed from the S&P 500, the Good Governance Index had the highest tracking error of 0.21% in 2010.

The differences can be explained partly by the fact that this study uses S&P 500 as the benchmark index, while the other two use MSCI and S&P/TSX 60 index. Each index has different characteristics such as the financial and ESG performance of the constituents, the weights of different industries, the correlation between firms and sectors, etc. These divergences can lead to the different performance of the tracking indices.

In addition, the total market capitalization of the 250 worst performers on corporate governance in the S&P 500 is less than 40% of the index's total market value (refer to Figure 5 and Appendix 2). These figures may be different from the MSCI Low Carbon Leaders index, as many of the securities being removed from the latter are in the oil and gas and related industries, which usually have high market capitalizations. The lower weights of the excluded stocks in the S&P 500 may lead to lower tracking error of the Good Governance Index from its benchmark compared to that of the MSCI Low Carbon Leaders index.

This paper contributes to the existing literature by demonstrating that it is possible to build a passive index with good ESG ratings and low tracking errors from the parent index. The Good Governance Index achieved lower tracking errors than major current ESG indices in the market in the recent years. The results are also consistent with Andersson et al. (2016) and Merz et al. (2016) in which the SRI index fund achieves similar or better risk-adjusted returns compared to its parent index. This provides investors with more opportunities to invest in companies that have good CSR activities and still meet their long-term financial goals. Moreover, the fact that the desired results are obtained using a simple rebalancing technique suggests that complicated software packages are not always necessary in building good investment products. The methodology of this research expands the works of D'Urso et al. (2013), Ruiz-Torrubiano and

Suárez (2009) and Shapcott (1992) on optimizing the quadratic tracking error model of a passive index.

Figure 5: Market capitalization of excluded stocks as percentages of index' total market value
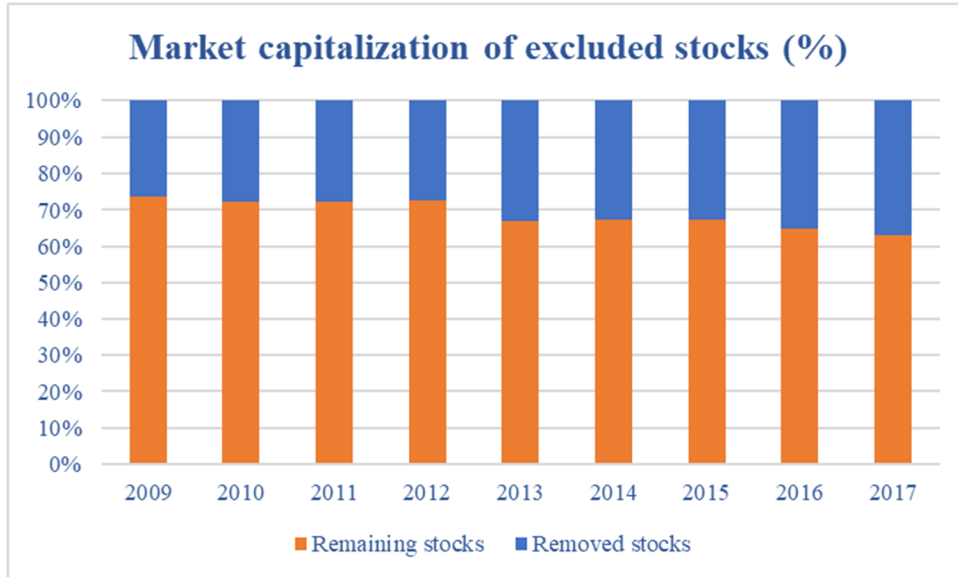
Last but not least, this paper supports Appel et al. (2016) and Fichtner et al. (2017), suggesting that the growth of passive ownership does not affect the corporate governance standards of companies. In fact, during the study period from 2008 to 2016 when passive investing expanded rapidly, many companies in the S&P 500 improved their scores in eight out of nine critical metrics.

7. Limitations and recommendations for future research

As discussed above, the cost issue creates one of the limitations of this research. The results could have been robust if the author could create the Good Governance Index using the BARRA Optimizer mentioned in Andersson et al. (2016) and then compare the findings. In addition, the Good Governance Index is only rebalanced once per year, while the S&P 500 is updated every quarter. This discrepancy may lead to higher tracking error of the Good Governance Index. Thus it is recommended to increase the updating frequency of the passive index to achieve more realistic results.

The second weakness of the study is related to comparing the risk-adjusted returns of the Good Governance Index and its benchmark. In this paper, the author only displays the annual returns of the two indices and the standard deviation of returns to proxy for risk. Ideally, such return and risk disparity should be tested using a more statistical approach, such as t-test for the difference between two population means.

The dataset created in this study can be used in future research to empirically investigate the effect of the passive ownership on the performance of firms in the S&P 500 on each corporate governance metrics. In addition, the proposed rebalancing approach can be applied to other aspects of the sustainable investing, such as social or environmental concerns. The results can then be compared to the findings of this study to examine if there are other factors that can influence the returns and tracking errors of the SRI passive index. Future research can also be done using other benchmark indices for different geographical locations, such as MSCI Europe, STOXX Europe 600, MSCI AC Asia ex Japan Index, etc.

8. Conclusion

This paper gives a basic demonstration of what investors may expect from the implementation of CSR constraints in index tracking when using minimal resources in terms of data and optimization tools. The primary research question of how adding ESG components, in this case, corporate governance score, to passive investment would affect the financial outcomes was examined using a database including nine governance provisions selected from Bloomberg and ASSET4. The Good Governance Index was constructed in nine years from 2009 to 2017, and its performance was calculated for the period from 2010 to 2018. Results show that when 50% of the benchmark constituents with the lowest scores were removed, the Good Governance Index had quadratic tracking errors of less than 1% in every year of the studied period. It also generated annualized risk-adjusted returns higher than those of the benchmark index. The findings support the ideas promoted by Andersson et al. (2016) that long-term investors can achieve both their financial and social goals using SRI passive index funds.

This study also presents the simple rebalancing technique when creating a tracking index: dividing the weights of the excluded securities to the remaining stocks in the same industries. Such reweighting approach is straightforward and simple for investors to understand, does not lead to high index turnover and high cost, and still achieve the desired results. The index created by this research has stable performance that matches well with the long run liabilities of many institutional investors while its low management fees and simple methodology suit the investors' operation capacity.

Unlike Schmidt and Fahlenbrach (2017) and Schmidt and Fahlenbrach (2017) who find that some problems may arise when the proportion of passive ownership in a company increases, this study suggests that the corporate governance standards of many firms in the S&P 500 index improved during the studied period. Among the nine provisions that are investigated, only golden parachute, which is proxied for takeover defense mechanism, remains a significant concern.

Even though there are still some limitations, this master's thesis acts as a proof of concept, demonstrating the approach for which institutional investors can use to incorporate ESG elements into their investment strategy. The outcomes are encouraging and could help to attract

more investors to SRI passive investment products. Future research can be built on this paper to test the procedure on other benchmark indices, or other ESG elements.

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Appendix

Appendix 1: Governance scores of S&P 500 index constituents

This table displays the number of firms that received different governance scores from 2008 to 2016. The highest score a company can get is nine.

Year of index formation	Year of governance data	Governance scores				
		Equal or less than 5	6	7	8	9
2009	2008	110	191	153	43	3
2010	2009	77	151	203	64	5
2011	2010	69	147	214	65	5
2012	2011	62	145	207	81	5
2013	2012	57	123	217	98	5
2014	2013	41	115	227	114	5
2015	2014	33	126	235	105	5
2016	2015	40	127	233	101	4
2017	2016	53	144	206	97	5

Appendix 2: Market capitalization of removed stocks

This table displays the market capitalization of the removed and remaining stocks as the percentage of the total index market value at the date of index formation.

Year of index formation	Market capitalization	
	Removed stocks	Remaining stocks
2009	26.421%	73.579%
2010	27.844%	72.156%
2011	27.751%	72.249%
2012	27.432%	72.568%
2013	33.062%	66.938%
2014	32.785%	67.215%
2015	32.797%	67.203%
2016	34.951%	65.049%
2017	36.790%	63.210%