ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
MSc Economics & Business
Master Specialisation Financial Economics

Socially Responsible Investing and Stock Performance

Evidence from the Southeast Asia Countries

Author: Nicholas Adhitya Surya
Student number: 474532
Thesis supervisor: Dr. Jan Lemmen
Finish date: 28 August 2018

PREFACE AND ACKNOWLEDGEMENTS

Firstly, I would like to express my deep gratitude to my thesis supervisor, Dr. Jan Lemmen, for his guidance and constructive feedbacks. His knowledge and critical thinking of the SRI studies have tremendously help me to keep making improvement with the master thesis. My deepest gratitude also goes to Vera and Asha for their unconditional love and support during the process of my master's study in Rotterdam. Foremost, I would like to thank Vera for providing me with her motivation words. She always had the right word to keep me motivating, when I was at the toughest time of confidence of finishing my master study in time. I would like to show my respect to my parents for their endless prayer and help on multiple aspects. Furthermore, I would also like to thank Ms. Lilyana Fikri who gave short academic writing course during my master thesis process. Lastly, I am also grateful to all my fellow student friends in Rotterdam for their support during my study in Erasmus University Rotterdam.

ABSTRACT

This paper investigates the performance of the companies which hold Environmental, Social and Governance (ESG) rating in the Southeast Asian region (ASEAN) during crisis and non-crisis period. Compared to matched non-ESG rated companies, the companies with high ESG score outperform during crisis and non-crisis period. We also modify the standard CAPM model and the Fama and French four-factor model by adding explanatory variable to eliminate small-cap firm effect. We find strong evidence that risk exposure does not only depends on market condition but also that ESG screening method presents different risk exposures across different market sequences.

Keywords:
Financial Crisis, Investment Decision, Socially Responsible Investment, Asset Pricing, ESG

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CHAPTER 1 Introduction

Since the Industrial Revolution, there has been a dramatic increase in fossil fuel production. However, this massive production seems to contribute to a serious destructive effect to both the environment and public health risks. One of the most significant current discussions in investment world is that investors are obliged to consider natural resources depletion, climate change, and pollution issues in their decision-making factors.

A recent research paper from the Asian Development Bank (ADB) found that countries in the Southeast Asia region are more likely to be affected by climate change risks. The study further states that the economic reliance on environmentally sensitive industries, high level of poverty, significant geometric growth of population and geographic susceptibility to climate impacts are some keys of the factors that increase the possibility of the Association of Southeast Asian Nations members (ASEAN) to be affected by the effect of climate changes. Thus, the ASEAN nations are required to confirm to sustainable issues and are compelled to increase the number of green investments (ADB 2017).

Since 2006, the conclusion of the Stern Review has strongly dictated the UK investment policy. This review was initiated by the British government to provide an overview of climate changes from an economics standpoint. The long Stern Review concludes that

> "The evidence shows that ignoring climate change will eventually damage economic growth. Our actions over the coming few decades could create risks of major disruption to economic and social activity, later in this century and in the next, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century. And it will be difficult or impossible to reverse these changes. Tackling climate change is the pro-growth strategy for the longer term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries. The earlier effective action is taken, the less costly it will be" (Stern Review, 2006).

Rapid development of investment products and strategies based on impact have spread across asset classes, allowing clients to simultaneously pursue both their financial and non-financial goals. It may also provide the potential for alpha or excess (risk-adjusted) return over

different market states. In the modern way of investing, Social Responsible Investment (SRI) can often be used to preserve risk and return as compared with other market rate investments.

As an impact from the proliferation of SRI activities, the academic world also responds to this phenomenon by producing considerable numbers of articles related to SRI. They focus their study in two major discussion topics. First, they discuss whether SRI funds outperform or underperform compared with traditional funds (Mollet et al. 2014; Ziegler, 2009; Bauer, 2006; Climent et al. 2011; Ito et al. 2013; Gil-Bazo et al. 2010; Kreander et al. 2005). Second, they encompass their research comparing weather SRI funds outperform or underperform non-ESG rated funds during a financial crisis period. (Nakai et al. 2015; Leite et al. 2015; Nofsinger and Varma 2014; Becchetti et al. 2015).

One of the limitations with the second type of studies is that the researchers use more than 12 months financial crisis period. There is a possibility that their result integrates other factors on fund performance. Such approaches, however, have failed to capture the immediate effect of SRI fund performance in financial crisis.

Even though there are numerous SRI research papers, only a few of these papers which observed the impact of investing in public equities, and none of them analysed the ESG rated companies from the Southeast Asia countries. By using classical asset pricing model, this paper aims to show more evidence on SRI public equities performance in Indonesia, Malaysia, Singapore, Thailand and Philippines (ASEAN Five). Therefore, the research question of this thesis is:

Do ESG rated companies outperform non ESG rated companies in the five observed ASEAN countries within the analysed period from 2008 to 2016?

In relation with the ASEAN markets, the analysis of equity performance of ESG rated companies in ASEAN throughout crisis and non-crisis periods has never been done. By using the Chow Test to pinpoint the structural breaks in the ASEAN stock markets, the exact crisis period in the ASEAN countries may be determined. Considering the Chow Test result, it is determined that the financial crisis period in the ASEAN started on September 2008 and ended in July 2009

Next, the ESG rated portfolios are created using ASSET4 ESG score, clean energy products score and community ratio score in order to further construct the High-Level, the Low-Level, the Sensitive Sector, the best-in-class portfolio.. Thus, it is deduced that only ESG rated portfolios that contain high ESG score companies outperforms conventional portfolio in the crisis and post crisis period.

The rest of this paper is organized as follows: section two presents the literature review which provides a brief overview of prior research on SRI performance and the approaches use to compare SRI performance with non-ESG rated investment. Section three explains the data and methodology which are used to determine the crisis period as well as the performance. Section four presents and discusses the result, and section five present the conclusion and limitation.

CHAPTER 2 Literature review

2.1 The Environmental, Social and Governance (ESG)

Nowadays, Environmental, Social and Governance (ESG) have become the main factors to evaluate financial performance of the companies. These criteria do not only help the investors to measure sustainability and ethical impact of an investment in companies, but also give a better input to the investor to determine the future financial performance of companies.

In recent years, investors begin to screen investment in terms of their impact on the environmental factor. The investors who are concerned about the environmental issues will weigh more environmental factors in their investment decision making process. Although the environmental factors such as the climate changes and the depletion of resources are not directly affected by market mechanism, it externally influences the function and revenue of the company. The investors calculate climate change factor in their financial calculation and they are also concerned about additional cost from early movement on it (Stern Review 2006); to be more specific, the companies which engage in non-environmentally sector are obliged to spend more money to rectify the environmental damage caused by the company's operations. As a result, the companies whose businesses rely on fossil fuel have become less attractive to this type of investors.

A relationship exists between social factor and the company future financial performance (Pena et al. 2017). Thus, the social screen must be taken into account to identify companies' sustainable competitive advantage. The statement from Hamilton et al. (1993) "doing well while doing good" could be used to understand the motive of why investor weigh their investment in social factors. It can be interpreted in two explanations. First, a high financial performance enables firm to save more money that could be used to invest more in socially responsible activities or can be called as 'available fund hypothesis' (Eichholtz et al. 2012). Second, a higher financial performance could be achieved from sustainable business practice, for instance, product enhancement, customer protection and employee diversity (Cornell & Shapiro, 1987; McGuire et al. 1988).

Since 2004, an increasing number of corporate governance practices bring the governance factor as one of investment decision considerations (Borgers et al. 2013). There are several subfactors named management structure, employee relation and executive compensation which are used to examine corporate governance's score.

2.2 Evidence from prior research

The vast majority of scholarly research related to SRI portfolios performance has increased considerably over the last decade, focusing on identifying the ways in which they are different from or similar to traditional investments. A surprisingly small number of academic papers have investigated SRI performance across different market states outside the US and European countries, be it through the performance of SRI public equity or SRI mutual funds. Most empirical studies in the impact of investing domain shows that SRI funds either outperform from traditional funds or underperform them.

In 2013, Borgers et al. demonstrated that during the period 1992 – 2004 stocks with high stakeholder index ratings outperformed stocks with low ratings. However, he found insignificant result particularly during period 2004 - 2009. They argue that this insignificant result is due to the investors' concerns over stakeholder problems which began to fade after 2004.

Three years later, Blaauwgeers (2016) performed the quantitative analysis of impact investing in public equities. She developed three types of impact investing portfolios and compared those portfolios with traditional portfolio using matched sampling method. Blaauwgeers found that the impact investing portfolio outperformed the traditional portfolio on impact performance.

Moreover, Limkriangkrai et al. (2017) investigated the independent effects of environmental (E), social (S), corporate governance (G), and the composite ESG ratings on stock returns and corporate financing decisions in the Australian equity market. There are three main findings from their study. First, highly composite ESG rating coincided with the companies leverage. Second, companies with low E and high G ratings tended to reduce debt, while companies with high G ratings held less cash. Moreover, companies with low G ratings had lower dividend payouts and S ratings had no impact on corporate financing decisions. Third, they found insignificant difference in risk-adjusted returns for portfolios based on ESG ratings, suggesting that there was no cost of ESG investment.

By utilizing the investor behavioral approach, Bollen (2007) provided in-depth studies of flows to and outflows from SRI funds and traditional funds. He employed a multi-attribute utility function to segregate societal value and the expected return and risk of the investment obtained by the investor. Based on this methodology, He found that the volatility of flow in socially responsible mutual funds was lower than the volatility of flow in conventional funds.

In the final part of his paper, Bollen discovered that SRI investors were less sensitive than conventional investors during a negative return period. Thus, SRI investors are less prone

to withdraw their funds into cash after experiencing negative returns compared to conventional investors. In a nutshell, this finding suggests that the utility of the socially responsible investors alleviate the poor accomplishment of SRI funds.

Ten years later, Riedl et al. (2017) suggested that social preferences and social signaling could explain the behavior of the SRI investor. They exhibited that financial motive was less important for SRI investor. The result shows that the SRI investor anticipate to earn lower returns on their investment' and pay higher investment cost which suggested that they only invest by following their social preferences.

By using the comparative analysis method, Munoz et al. (2013) investigated stock-picking and style-timing abilities of conventional and socially responsible (SR) mutual funds in the US market. They discovered three main fundamental findings. First, they found a little difference between conventional and SRI fund managers in stock-picking skills, an absence ability of style-timing skills and momentum styles. Second, both the conventional and SRI funds managers' style-timing skill were not influenced by the size of the funds, but in term of age. Third, each manager from these two types of investing implemented the superior information to time the book-to-market style.

Several attempts have been made to investigate fund performance in different market states. (Wang, 2010; Glode, 2011; Kosowski, 2011). They observed that there was correlation between fund manager' ability and conventional mutual fund performance during crisis period. It shows that conventional mutual perform better during recession compared to expansion period. Three years later, Kacperczyk et al. (2014) supported this argument, suggesting that skilled fund managers tended to perform better timing abilities during recessions and better selectivity abilities during expansion period.

Furthermore, in 2014, Nofsinger and Varma compared the performance of the U.S. SRI and conventional mutual funds from 2000 to 2011. They separated their research into two different economics states (crisis period and non-crisis period) and found that SRI funds significantly outperformed traditional funds during crisis period, while significantly underperformed during non-crisis period. They attributed this asymmetric pattern with environmental, social and governance (ESG) positive screening.

With respect to SRI funds, Leite and Cortez (2015) investigated the performance of SRI and conventional funds during market crises in France. They split the period of crisis into three parts: the technology bubble burst (January 2001–March 2003), the global financial crisis (June 2007–February 2009), and the euro sovereign debt crisis (May 2011–May 2012). They noticed that SRI funds with negative screen underperformed during non-crisis period when compared

with conventional funds. It has conclusively been shown that SRI positive screening is unable to provide additional protection to investors.

By using both market model and multifactor model, Becchetti et al. (2015) observed the performance of SRI and conventional funds in several countries from January 1992 to April 2012. They claimed that SRI funds significantly outperformed conventional ones in all markets except those in North America during the global financial crisis between December 2007 and June 2009. However, they did not find different performance during the technological bubble during March – November 2001.

In addition, Henke (2016) studied the impact of ESG screening to the financial performance of corporate bonds in US and Eurozone. The researcher split his time analyses into crisis and non-crisis period. He observed that the socially responsible bonds which screened by ESG outperform conventional funds during financial crisis.

Using vote-count and second-order meta-analysis studies, Friede et al. (2015) investigated a correlation between ESG criteria and corporate financial performance (CFP). By employing more than 2000 previous academic papers, they detected that 33.3% of the 402 netted final sample studies which analysed the Asian developed regions possessed positive share. They also stated that Emerging market sample had 65.4% higher positive outcomes than developed market had. The spread became considerable when they only focused on equity-linked studies.

By taking the bankruptcy of Lehman Brothers as a particular event, Nakai et al. (2016) compared the average cumulative abnormal returns of Japanese SRI funds with conventional funds. They employed the Fama–French three-factor model and EGARCH model to analyze the performance of SRI funds during that particular event. They observed that SRI funds better resisted the bankruptcy of the Lehman Brothers than conventional funds. They also attributed the result with investor evaluation on international firms CSR activities, suggesting that investors are more intense to evaluate CSR activities of international firm than domestic companies.

Additionally, Baughn et al. (2007) measured both component of social and environmental corporate social responsibility (CSR) in 15 Asian countries. They argue that CSR activities could be analysed using the combination of the absolute level that appeared in a given country and level of activities related to the countries' economics freedom, economic development and corruption intensity. Based on the overall sample, they concluded that government corruption is the strongest factors to predict both of the CSR components.

Furthermore, Berkhout et al. (2010) provided the in-depth analysis of the potential role of 'sustainability experiments' showing its relevance to generate new 'greener' growth models in East and South Asian countries. They suggested that this experiment could provide a new source of innovation and capability formation. It also coincided to technology flows and wider knowledge, which could contribute to alternative improvement pathways in underdeveloped countries.

Another study done by Aure and Schuhmacher (2015) analysed the performance of socially responsible and irresponsible investment in Asia-Pacific region as well as in the United States and Europe. First of all, it is observed that the outcome can be determined by focusing on the ESG based investment strategy namely the geographic and industry focus as well as the ESG criteria. Furthermore, in both Asia-Pacific region and the United States, choosing high (low) ESG stocks does not seem to consistently raise or reduce investment performance in comparison with the bench-marks and to low (high) ESG stocks.

Secondly, in both Asia-Pacific region and the United States, investors who focus on ethical utility acquired from their portfolio selection can abide the ESG based investment style and still acquire a performance much the same to the broad market. Nevertheless, subject to the industry focus and the ESG specification used, European investors are likely to compensate for SRI.

In 2001, Kemp discovered that the global financial crisis did not only lower Indonesia's economic growth, but also damaged certain factors which had a connection with CSR. This factor could influence a company's ideal perception of CSR. He also argued that CSR had a strong correlation with environmental degradation and natural resources exploitation in Indonesia, which can be inferred that if the CSR of company is good, the degradation of environment and the exploitation of natural resources are likely to reduce.

Chen et al. (2016) investigated the correlation between mutual fund performance and corporate social responsibility (CSR) ranking of fund management companies in China. They divided the samples into two groups named the high CSR ranking group and the low CSR ranking group. By using the quantile regression model with the Fama&French three-factor to evaluate the fund management performance, they found that the high CSR ranking fund management companies had a higher return than the low CSR ranking fund management companies had. On the other hand, the high CSR ranking groups had a lower return than the low CSR ranking group had. Moreover, they discovered that the group that had a high CSR ranking and below medium fund return had a positive correlation with size factor.

Finally, Cheung et al. (2009) observed the correlation between corporate social responsibility (CSR) and company performance in Asian Emerging Markets (AEM). They discovered a positive and significant correlation between market valuation and CSR's implementation in AEM's. Furthermore, they also coincided change in CSR scores of Asian firms with the future market-adjusted return of the companies.

2.3 Hypotheses

Taking into account the SRI domain both in western countries and in the Southeast Asia regions, this paper examines the performance of ESG rated equity portfolio and the conventional equity portfolio which does not have ESG rated companies in their portfolio. Thus, the hypotheses for this paper are:

H1: High-Level ESG rated portfolio perform better compared to Low-Level ESG rated portfolio during crisis and non-crisis period.

H2: The thematic ESG rated portfolios outperform non ESG rated matched conventional portfolio in every market condition.

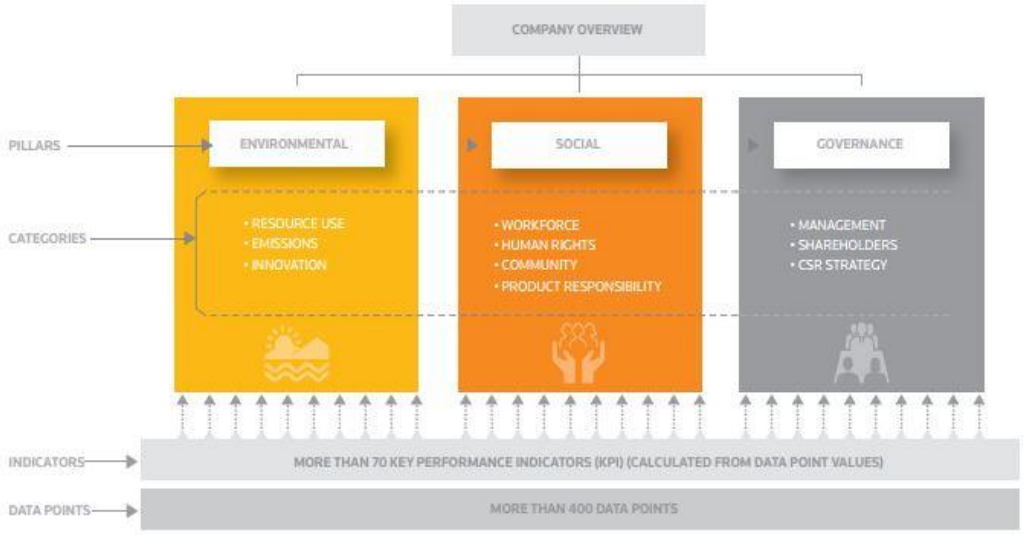
CHAPTER 3 Data and Methodology

3.1 Data Collection

The impact of investing equity portfolio performance is examined using the monthly data from 2008 to 2016. The data sample consist of public listed companies from five stock exchange markets in Southeast Asia region. The market and financial data are obtained from Datastream which contain more than 1.800 active companies, covering Indonesia, Malaysia, Singapore, Philippines and Thailand major indices. All data from Datastream is denominated in U.S Dollar to ensure comparability.

Furthermore, environmental, social, and corporate governance scores are obtained from Thomson Reuters ASSET4 database. The ASSET4 provides transparent, objective and extensive platform to asses corporate ESG performance using more than 400 different ESG data points, and adopts ten main ESG categories measurement to rate the company ESG performance (see Figure 1) which are collected from the company performance data that is publicly available (annual report, corporate website, sustainable report, etc.).

Figure 1. The ASSET4 ESG main frame



source:http://financial.thomsonreuters.com/content/dam/openweb/documents/pdf/financial/trbc-fact-sheet.pdf

The ASSET4 employ three steps to establish indicator metric score. First, they implement yes/no question. For instance, the score of "product innovation/renewable/clean energy products" is scored using these questions: "Has the company set targets or objectives to be achieved for environmental product innovation?" and "Does the company describe, claim to have or mention the processes it uses to accomplish environmental product innovation?". The yes/no scoring leads to less subjective result because it does not directly rate ESG indicator metric with value. Second, they add final question which is also required yes/no answer: "Does the company report on at least one product line or service that is designed to have positive effects on the environment or which is environmentally labeled and marketed?". Finally, they convert the yes/no answer into score of "product innovation/renewable/clean energy products" metric. This metric will influence the total ESG score of the company.

Moreover, the ESG pillars in our sample have score ranges from 1.31 to 98.62, where the median is around 40, indicating that it is a relatively rating score. However, only 182 companies from the total sample population are rated by ASSET4 in 2016. As not all ESG scores are available for each firm, the number of companies in portfolios between ESG and traditional portfolio are differentiated every year. The detail of portfolio construction will be explained in section 3.2 below. Based on these ESG rated companies, violating SRI list screen indicators are extracted from ASSET4 database, and these include alcohol, tobacco, gambling, armaments, pornography, nuclear, and animal testing (Renneboog et al., 2008). These factors are used to determine whether the company operates in SRI positive area or not.

Table 1. Summary Statistic

The table shows the summary statistics of the full sample of ESG rated companies; it covers ten-year data from 182 companies. Escore presents the score of environment pillar, while Sscore presents the score of social pillar and Gscore presents of governance pillar. Moreover, CleanScore indicates the score of corporate green initiative score to produce environment friendly products and SocietyScore indicates the score of corporate activities impact to the society. Return_M indicates monthly return of the companies. log_Asset indicates the natural logarithm of total asset and T_Asset presents total asset of companies in USD.

Variable	Mean	Median	Min	Max	St.dev	Kurtosis	Skewness
Escore	44.42	37.11	6.22	96.94	27.74	2.00	0.45
Sscore	49.04	38.16	1.83	98.62	29.81	1.73	0.28
Gscore	42.79	41.57	1.31	96.99	25.60	1.97	0.18
CleanScore	30.56	33.62	0.00	99.99	25.11	5.03	1.17
SocietyScore	58.21	58.39	1.84	98.31	29.79	1.67	-0.18
Return_M	0.52	0.50	-70.92	118.15	8.48	12.01	0.02
T_Asset	19,500,000	5,672,221	216,076	359,000,000	40,500,000	28.44	4.57
log_Asset	15.72	15.55	12.28	19.70	1.40	2.80	0.37

Finally, MSCI ASEAN AC Index, MSCI ASEAN Small-Cap Index and the financial parameters named market capitalization, total asset and monthly stock prices are retrieved from Datastream.

Table 2. Summary ESG Rated Companies

The table shows the summary of the number of companies which are rated by ASSET4 in all ASEAN 5 countries from 2006 to 2016.

	# of ESG Rated Companies					
Year	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Total**
2006	-	-	-	26	-	26
2007	-	-	-	28	2	30
2008	6	10	1	34	5	56
2009	12	13	5	38	10	78
2010	22	34	16	38	19	129
2011	22	37	19	39	20	137
2012	25	38	19	39	24	145
2013	30	40	21	39	28	158
2014	32	43	23	39	32	169
2015	34	45	24	39	35	177
2016	35	46	24	40	37	182

3.2 Constructing ESG Portfolio

In general, social responsibility investing implies negative or positive SRI screening method to construct the investment portfolio. Renneboog et al. (2008) determined SRI positive companies are those companies that use environment, social and ethical parameters named alcohol, tobacco, gambling, armaments, pornography, nuclear, and animal testing. If the company does not generate profit from those activities, the company will be determined as SRI positive company. This method is implemented to develop several ESG equity portfolios.

3.2.1 Constructing High-level and Low-level portfolio

Firstly, the sample are split into two parts: *SRIPOSITIVE* and *SRINEGATIVE*. The company is determined as *SRIPOSITIVE* if the company does not create revenue from SRI violating sector and *SRINEGATIVE* if otherwise. Subsequently, companies which have *SRINEGATIVE* category will not be included in the next step.

Secondly, High-Level and Low-Level ESG score portfolio are constructed. *SRIPOSITIVE* companies are selected from database, while the ESG score from each company are added up, and five decile portfolios are created based on the total ESG score. The portfolios

are then rebalanced every year in the beginning of January. The first and the fifth deciles only are to be considered as the portfolio named High-Level and Low-Level portfolio respectively.

Table 3. Number of firms in High-Level, Low-Level and Sensitive Sector portfolio

The table shows the summary number of companies which are included in High-Level, Low-Level and Sensitive Sector ESG portfolio from 2006 to 2016.

Year	Indonesia	Malaysia	Philippines	Singapore	Thailand	Total
# of Firms in High Level Portfolio						
2006	-	-	-	6	-	6
2007	-	-	-	5	1	6
2008	-	-	-	12	-	12
2009	1	-	1	13	1	16
2010	1	3	5	15	2	26
2011	2	6	4	13	3	28
2012	4	5	5	13	2	29
2013	9	2	8	12	1	32
2014	9	5	7	11	2	34
2015	13	4	9	7	3	36
2016	15	5	7	5	5	37
# of Firms in Low Level Portfolio						
2006	-	-	-	5	-	5
2007	-	-	-	5	1	6
2008	1	-	-	7	3	11
2009	1	2	1	8	3	15
2010	3	4	4	9	5	25
2011	3	7	3	8	6	27
2012	2	8	4	9	6	29
2013	2	8	3	10	8	31
2014	1	9	4	10	9	33
2015	2	9	4	12	8	35
2016	-	11	5	12	8	36
# of Firms in Sensitive Sector Portfolio						
2006	-	-	-	4	-	4
2007	-	-	-	4	2	6
2008	1	3	-	4	2	10
2009	3	3	1	5	3	15
2010	7	7	4	5	7	30
2011	7	9	6	6	8	36
2012	8	9	6	6	9	38
2013	8	10	7	6	9	40
2014	8	12	7	6	10	43
2015	8	13	7	6	12	46
2016	8	13	7	7	12	47

3.2.2 Constructing Sensitive Sector portfolio

As written in the first chapter, the ASEAN countries are very vulnerable to the impacts of the climate change. The environmental investor in the ASEAN stocks market, however, also understand this issue as an important factor to make an investment decision. One section in this paper tests an extreme condition whether the ESG portfolio which contain all companies from sensitive sectors could generate superior return than its non-ESG rated matched conventional portfolio.

Constructing the environment sensitive portfolio to distinguish the performance of the companies that generated profit in environment sensitive sectors (transportation, electricity, chemical industry, mining, oil and gas) is following Derwall et al. (2004) method. To create this portfolio, the *SRIPOSITIVE* companies which operated in these particular industries are selected and sorted based on their environment scores. Only companies which have environment score higher than 65 are to be considered (see Table 3). In this particular portfolio, the portfolios are also rebalanced every year in January.

3.2.3 Constructing best-in-class portfolios

The three best-in-class portfolios are developed to synthetize the ESG rated portfolios performance in real investment practice. The *SRIPOSITIVE* companies are segregated into two categories which are *ESG_HIGH* and *ESG_LOW*. The company is entitled for *ESG_HIGH*, if it has a score higher than 65 on either environmental, social and governance. In addition, the other two score parameters must be equal to 50 or higher. To make it clear, if the environmental score is 65 or higher and the social and governance score are 50 or higher, a company will be classified as *ESG_HIGH*. It also applies for social and governance parameters. However, if a company does not meet the aforementioned criteria, it would be determined as *ESG_LOW*.

Furthermore, *ESG_HIGH* companies are distinguished by three thematic portfolios namely Environment, Social and Total. First, the Environment portfolio are firms which have SRI positive screening, high ESG scores and produce renewable green energy product. Renewable energy is quite new for the ASEAN companies; thus, not all companies produce clean energy or renewable product. In Southeast Asia, finding a company which generates assets from sustainable energy or is known as clean energy company is quite arduous (see table 5). There is only one equity index specialized on Asian companies which generates asset from clean energy. However, there is none of Southeast Asia companies on the list. Therefore the "product innovation/renewable/clean energy products scores" that were retrieved from

Table 4. Number of firms in the three best-in-class portfolios

The table shows the summary of the number of companies which are included in the Environment, the Social and the Total portfolio. The total number of companies in the total portfolio is higher than other portfolios because the total portfolio is a combination from the Environment and the Social portfolio from 2006 to 2016.

Year	Indonesia	Malaysia	Philippines	Singapore	Thailand	Total
# of Firms in Total Thematic Portfolio						
2006	-	-	-	1	-	1
2007	-	-	-	1	-	1
2008	-	-	-	3	3	6
2009	-	2	-	6	1	9
2010	-	3	-	5	3	11
2011	1	5	-	7	5	18
2012	2	8	1	6	3	20
2013	1	9	-	7	4	21
2014	-	9	2	6	8	25
2015	3	12	9	13	12	49
2016	6	13	10	18	14	61
# of Firms in Environment Thematic Portfolio						
2006	-	-	-	-	-	-
2007	-	-	-	-	-	-
2008	-	-	-	-	-	-
2009	-	1	-	1	-	2
2010	-	2	-	1	1	4
2011	-	2	-	2	1	5
2012	-	2	1	2	1	6
2013	-	2	-	2	1	5
2014	-	2	-	2	4	8
2015	-	2	3	3	6	14
2016	-	2	3	3	6	14
# of Firms in Social Thematic Portfolio						
2006	-	-	-	1	-	1
2007	-	-	-	1	-	1
2008	-	-	-	3	3	6
2009	-	2	-	6	1	9
2010	-	3	-	5	3	11
2011	1	5	-	6	5	17
2012	2	8	1	6	3	20
2013	1	9	-	7	4	21
2014	-	8	2	6	8	24
2015	3	12	9	12	12	48
2016	6	13	10	18	14	61

ASSET4 database are used. This parameter evaluates whether the company establishes clean energy product or not. The scores range are between 0 and 100, and only companies that have the score above 65 are included to the Environment portfolio. Second, the Social portfolio contains firms which have SRI positive screening, high ESG scores and high society to community ratio score. The community ratio score is extracted from one of ASSET4 social

parameter which is "society/community". This parameter depicts the company's engagement impact to local societies. The score ranges from 0 to 100, and only companies which have score above 65 are put into the Social portfolio. Third, the Total portfolio contains the summary of firms from the Environment and the Social portfolio.

These three best-in-class portfolios depict the companies which operate in non-violating sectors, have high ESG scores and also focus to bring positive impact to the local community. In a nutshell, the reason why the portfolios are divided into three thematic categories is to get a clear picture whether the rating would impact to equity performance as one unity or as an individual factor.

3.3 Matched Pair Method

Back in the 1995, Mallin et al. implemented a matched pair method to investigate ethical fund performance. They compared ethical fund performance with non-ethical fund based on age and size in the United Kingdom. Not surprisingly, they found that ethical funds outperform non-ethical fund even though only few alphas were significant. In the subsequent study, Gregory et al (1997) criticized Mallin et al. (1995) study. They argued that the finding was skewed by smaller market capitalization companies. Furthermore, they re-evaluated the previous study by controlling size premium and using two-factor model to overcome the small-cap bias problem. In the latter study, using the matched pair method, Kreander et al. (2005) extended Mallin et al (1995) study. They also adopted two factor model to control fund size. They found similar result with Mallin et al. (1995).

Considering aforementioned issue and adapting the modern SRI studies from Nofsinger et al. (2014) and Renneboog et al. (2008), the matched pair method will be applied to evaluate the equity portfolio performance of ESG rated companies with non ESG rated companies (traditional equity performance), and the matched pair method is replicated to develop the traditional equity portfolio by matching companies' asset size, date and industry sector. Simple matching method in STATA is employed which is similar to the nearest-neighbour match.

First, *SRIPOSITIVE* database is combined with the *SRINEGATIVE* by date and sector. At this point, all pairs of the *SRIPOSITIVE* companies which have the same sector and date are now paired. Subsequently, the ratio is generated by dividing *SRIPOSITIVE* total asset with each paired of *SRINEGATIVE* total asset. Furthermore, criteria is created which to drop all observations which have asset ratio range above and below 30% from paired *SRIPOSITVE* companies. In this stage, all *SRINEGATIVE* companies that have ratio outside the range are

Table 5. The ASEAN 5 market capitalization by sector

This table depicts yearly market capitalization of The ASEAN 5 (Indonesia, Malaysia, Singapore, Thailand and Philippines) by sector industry. MV represents total sector market capitalization in million U.S dollar, and % represents the percentage of sector market capitalization to total sample market capitalization from five ASEAN countries stock exchanges. Sectors are classified based on the Datastream classification. The sectors are grouped into four main clusters. First, Clean Sector consists of sectors which produces clean energy or related with health industry. Second, Sensitive Sector consists of sectors which are generated income in the environment sensitive area. Third, Financial Sector consists of companies which are related to financial industry. Fourth, Other sector consists of sectors which are not related with aforementioned industries.

Sector	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
	MV	%	MV	%	MV	%	MV	%	MV	%	MV	%	MV	%	MV	%	MV	%	MV	%	MV	%
Clean Sector	**7.92**	**0.9%**	**8.98**	**0.8%**	**5.28**	**0.9%**	**10.87**	**1.0%**	**16.76**	**1.1%**	**20.26**	**1.3%**	**37.14**	**1.9%**	**40.82**	**2.1%**	**51.41**	**2.5%**	**55.85**	**3.2%**	**59.73**	**3.1%**
Alternative Energy	0.04	0.0%	0.03	0.0%	0.01	0.0%	0.02	0.0%	0.03	0.0%	0.02	0.0%	0.05	0.0%	0.08	0.0%	0.32	0.0%	0.24	0.0%	0.16	0.0%
Health Care Equipment and Services	4.07	0.5%	4.66	0.4%	3.30	0.5%	6.22	0.6%	8.40	0.5%	12.07	0.8%	25.58	1.3%	29.11	1.5%	37.35	1.8%	44.67	2.6%	46.49	2.4%
Pharmaceuticals and Biotechnology	3.82	0.5%	4.30	0.4%	1.97	0.3%	4.63	0.4%	8.33	0.5%	8.17	0.5%	11.51	0.6%	11.63	0.6%	13.75	0.7%	10.94	0.6%	13.09	0.7%
Sensitive Sector	**155.10**	**18.5%**	**250.97**	**21.9%**	**119.51**	**19.6%**	**219.13**	**19.9%**	**347.85**	**22.3%**	**343.61**	**21.9%**	**379.26**	**19.1%**	**369.50**	**19.0%**	**353.08**	**17.0%**	**286.23**	**16.5%**	**340.06**	**17.8%**
Chemicals	3.53	0.4%	3.82	0.3%	2.78	0.5%	4.22	0.4%	35.49	2.3%	40.75	2.6%	41.98	2.1%	41.64	2.1%	35.41	1.7%	35.79	2.1%	46.14	2.4%
Electricity	21.29	2.5%	23.85	2.1%	16.53	2.7%	26.21	2.4%	33.04	2.1%	36.65	2.3%	48.26	2.4%	49.53	2.6%	54.48	2.6%	52.51	3.0%	55.37	2.9%
Forestry and Paper	2.50	0.3%	2.36	0.2%	1.24	0.2%	2.50	0.2%	3.35	0.2%	3.73	0.2%	2.54	0.1%	2.70	0.1%	1.99	0.1%	1.48	0.1%	2.15	0.1%
Gas, Water and Multiutilities	23.50	2.8%	28.36	2.5%	19.46	3.2%	31.86	2.9%	40.91	2.6%	37.41	2.4%	45.48	2.3%	47.17	2.4%	48.01	2.3%	35.80	2.1%	34.45	1.8%
Industrial Engineering	7.81	0.9%	19.56	1.7%	4.94	0.8%	13.24	1.2%	22.59	1.4%	19.95	1.3%	17.87	0.9%	16.32	0.8%	15.76	0.8%	12.53	0.7%	13.24	0.7%
Industrial Metals and Mining	7.76	0.9%	16.65	1.5%	5.32	0.9%	9.75	0.9%	15.50	1.0%	12.04	0.8%	11.42	0.6%	10.25	0.5%	13.21	0.6%	7.43	0.4%	11.96	0.6%
Industrial Transportation	26.37	3.2%	30.68	2.7%	18.39	3.0%	27.45	2.5%	30.12	1.9%	37.52	2.4%	48.37	2.4%	56.63	2.9%	61.98	3.0%	57.64	3.3%	66.27	3.5%
Mining	8.19	1.0%	32.69	2.8%	10.55	1.7%	36.08	3.3%	65.41	4.2%	60.15	3.8%	48.09	2.4%	30.07	1.5%	28.52	1.4%	18.50	1.1%	28.44	1.5%
Oil and Gas Producers	36.49	4.4%	64.64	5.6%	30.13	5.0%	46.73	4.2%	69.54	4.5%	64.20	4.1%	71.73	3.6%	64.90	3.3%	58.63	2.8%	42.69	2.5%	62.81	3.3%
Oil Equipment and Services	17.67	2.1%	28.35	2.5%	10.18	1.7%	21.09	1.9%	31.91	2.0%	31.22	2.0%	43.52	2.2%	50.30	2.6%	35.09	1.7%	21.86	1.3%	19.23	1.0%
Financial Sector	**253.54**	**30.3%**	**303.80**	**26.5%**	**161.91**	**26.6%**	**288.35**	**26.2%**	**379.59**	**24.3%**	**353.37**	**22.5%**	**449.71**	**22.7%**	**444.27**	**22.9%**	**497.52**	**23.9%**	**397.35**	**22.9%**	**439.26**	**22.9%**
Banks	158.69	19.0%	191.94	16.7%	110.61	18.2%	220.05	20.0%	304.28	19.5%	294.59	18.8%	372.80	18.8%	350.69	18.1%	396.98	19.1%	308.07	17.7%	337.48	17.6%
Financial Services	14.44	1.7%	16.44	1.4%	9.84	1.6%	16.10	1.5%	23.15	1.5%	23.13	1.5%	28.36	1.4%	25.90	1.3%	31.02	1.5%	28.78	1.7%	32.73	1.7%
Insurance (life and non-life)	80.41	9.6%	95.41	8.3%	41.47	6.8%	52.20	4.7%	52.15	3.3%	35.65	2.3%	48.54	2.4%	67.69	3.5%	69.52	3.3%	60.51	3.5%	69.05	3.6%
Others	**420.05**	**50.2%**	**583.83**	**50.9%**	**321.48**	**52.9%**	**584.04**	**53.0%**	**816.33**	**52.3%**	**852.12**	**54.3%**	**1,115.68**	**56.3%**	**1,086.26**	**56.0%**	**1,175.90**	**56.6%**	**996.71**	**57.4%**	**1,076.31**	**56.2%**
Aerospace & Defense	5.95	0.7%	7.87	0.7%	4.73	0.8%	7.17	0.7%	8.01	0.5%	6.36	0.4%	9.73	0.5%	9.91	0.5%	8.19	0.4%	6.68	0.4%	7.09	0.4%
Automobiles and Parts	10.19	1.2%	16.85	1.5%	6.57	1.1%	19.79	1.8%	33.43	2.1%	43.75	2.8%	44.83	2.3%	35.72	1.8%	35.34	1.7%	24.70	1.4%	30.95	1.6%
Beverages	11.29	1.3%	11.60	1.0%	8.35	1.4%	11.74	1.1%	20.12	1.3%	17.95	1.1%	28.88	1.5%	30.82	1.6%	34.93	1.7%	29.87	1.7%	36.96	1.9%
Construction and Materials	27.90	3.3%	38.89	3.4%	16.60	2.7%	36.84	3.3%	55.32	3.5%	53.62	3.4%	75.15	3.8%	68.24	3.5%	81.57	3.9%	70.35	4.1%	76.62	4.0%
Electronic and Electrical Equipment	5.56	0.7%	6.20	0.5%	2.43	0.4%	4.60	0.4%	6.68	0.4%	5.02	0.3%	6.81	0.3%	8.01	0.4%	9.99	0.5%	10.32	0.6%	12.31	0.6%
Telecommunications	103.41	12.4%	126.85	11.1%	75.08	12.3%	118.05	10.7%	133.61	8.6%	150.48	9.6%	188.78	9.5%	184.17	9.5%	207.48	10.0%	158.83	9.1%	153.71	8.0%
Food and Drug Retailers	5.48	0.7%	7.58	0.7%	7.48	1.2%	12.10	1.1%	20.02	1.3%	23.57	1.5%	34.76	1.8%	31.50	1.6%	31.28	1.5%	25.59	1.5%	33.94	1.8%
Food Producers	42.94	5.1%	89.54	7.8%	46.03	7.6%	94.27	8.6%	127.66	8.2%	132.40	8.4%	145.06	7.3%	145.98	7.5%	142.53	6.9%	118.48	6.8%	133.40	7.0%
General Industrials	29.38	3.5%	56.57	4.9%	35.55	5.8%	59.47	5.4%	88.73	5.7%	87.04	5.5%	111.32	5.6%	103.01	5.3%	107.53	5.2%	85.40	4.9%	101.32	5.3%
General Retailers	15.94	1.9%	22.49	2.0%	12.81	2.1%	23.60	2.1%	37.76	2.4%	44.53	2.8%	62.04	3.1%	60.83	3.1%	62.59	3.0%	56.01	3.2%	63.15	3.3%
Household Goods and Home Construc	1.12	0.1%	1.29	0.1%	0.77	0.1%	1.35	0.1%	1.72	0.1%	1.74	0.1%	2.38	0.1%	2.07	0.1%	3.41	0.2%	2.61	0.2%	3.29	0.2%
Media	9.80	1.2%	14.35	1.3%	7.71	1.3%	10.67	1.0%	15.26	1.0%	19.33	1.2%	35.76	1.8%	31.93	1.6%	32.53	1.6%	25.76	1.5%	21.34	1.1%
Personal Goods	7.35	0.9%	7.59	0.7%	6.50	1.1%	11.34	1.0%	17.28	1.1%	19.78	1.3%	21.37	1.1%	22.37	1.2%	26.42	1.3%	27.25	1.6%	29.79	1.6%
Real Estate Investment and Services	78.61	9.4%	97.02	8.5%	46.25	7.6%	93.77	8.5%	125.55	8.0%	117.65	7.5%	188.64	9.5%	187.15	9.6%	212.16	10.2%	196.63	11.3%	208.81	10.9%
Support Services	1.38	0.2%	1.58	0.1%	1.08	0.2%	1.44	0.1%	2.08	0.1%	2.73	0.2%	3.87	0.2%	4.54	0.2%	5.78	0.3%	6.41	0.4%	7.22	0.4%
Technology	5.58	0.7%	5.62	0.5%	2.99	0.5%	5.59	0.5%	9.56	0.6%	12.39	0.8%	20.81	1.0%	25.54	1.3%	31.65	1.5%	25.83	1.5%	27.48	1.4%
Tobacco	10.43	1.2%	12.39	1.1%	7.43	1.2%	13.30	1.2%	26.94	1.7%	37.47	2.4%	45.10	2.3%	36.29	1.9%	39.88	1.9%	43.56	2.5%	46.19	2.4%
Travel & Leisure	47.76	5.7%	59.54	5.2%	33.11	5.5%	58.96	5.4%	86.60	5.6%	76.32	4.9%	90.39	4.6%	98.18	5.1%	102.64	5.0%	82.46	4.8%	82.74	4.3%
Total Market Value	**836.62**	**100.0%**	**1,147.58**	**100.0%**	**608.18**	**100.0%**	**1,102.39**	**100.0%**	**1,560.52**	**100.0%**	**1,569.36**	**100.0%**	**1,981.79**	**100.0%**	**1,940.85**	**100.0%**	**2,077.91**	**100.0%**	**1,736.15**	**100.0%**	**1,915.36**	**100.0%**

purged. The final stage is creating some random numbers to randomly capture closeness of match of the total asset.

As mentioned in above paragraph, the small-cap firm size bias issue would be further explained in the last section of this chapter.

3.4 The four-factor model

We use Fama&French three factor model (1993), augmented by Carhart (1997) as the main asset pricing model to calculate risk-adjusted (excess) return of the ESG and non-ESG rated portfolio. Moreover, this paper also compares the alphas from the Fama&French four-factor model with the alphas from the Capital Asset Pricing Model (CAPM) and the Fama&French three-factor model.

Initially, the return of each company is calculated based on the monthly closing price and with the formula below.

$$\boldsymbol{r_{i,t} = \frac{(p_{i,t} - p_{i,t-1})}{p_{i,t-1}}}$$

Where $p_{i,t}$ refer to closing price at the end of the month t and $p_{i,t-1}$ refers to the first trading day's price of the month. Subsequently, monthly portfolio is created and return based on the average of return from portfolio company members.

Next, we estimate the alphas for ESG and non-ESG rated portfolio using the CAPM:

$$\boldsymbol{r_{i,t} - r_{f,t} = a_i + \beta_i (r_{m,t} - rf_{,t}) + \varepsilon_{it}} \quad (1)$$

Where $r_{i,t} - r_{f,t}$ is the monthly portfolio return minus the U.S. one-month treasury bill rate ($r_{f,t}$). The US treasury bill rate is used because of ASEAN countries do not have the single region currency such as the euro in the Europe zone, and they also use U.S. dollar as a benchmark of their country's trade balance. So, the author believes that U.S treasury bill is the most appropriate risk-free rate for the ASEAN countries. The alpha (a_i) is known as the Jensen's alpha, $r_{m,t} - rf_{,t}$ (MKT) which is the excess market return.

The Fama&French three factor model enhances the CAPM model by adding size and value factors to the market factor (MKT) with the specification below:

$$\boldsymbol{r_{i,t} - r_{f,t} = a_i + \beta_i (r_{m,t} - rf_{,t}) + s_i SMB_{i,t} + h_i HML_{i,t} + \varepsilon_{it}} \quad (2)$$

Where, $SMB_{i,t}$ is the difference between monthly simple average of return on three small stocks portfolio (S/L, S/M and S/H) and three the big stocks portfolio (B/L, B/M and

B/H). $HML_{i,t}$ is firm value factor that is calculated using differences between monthly simple average of return from two size portfolios which have a high book to market and low book to market.

Finally, the Fama&French three-factor model, augmented by the Carhart momentum factor is constructed with the following specification:

$$\boldsymbol{r_{i,t} - r_{f,t} = a_i + \beta_i \left(r_{m,t} - rf_{,t}\right) + s_i SMB_{i,t} + h_i HML_{i,t} + w_i WML_{i.t} + \varepsilon_{it}} \qquad (3)$$

The additional $WML_{i.t}$ factor is a calculation of the equal weighted average of two winner portfolio minus two loser portfolios.

All factors were retrieved from the Kenneth French data library website. We use Fama&French Asia Pacific excluding Japanese database which is compatible to our research sample background.

Table 6. The summary statistics of Fama&French factors

The table presents the summary statistics of Fama&French three factors model augmented by the Carhart momentum factor. MKT is the excess return of portfolio minus the risk-free rate for that month. SMB (Small Minus Big) is the difference between monthly simple average of return on three small stocks portfolio. HML is the difference between return of the low market to book value minus the high market to book value portfolio. WML (winner minus loser) is difference of stock portfolio between the high prior return companies minus the low prior return companies. RF is one month the US treasury bill.

Variable	Mean	Median	Min	Max	St.dev	Kurtosis	Skewness
MKT	0.54	0.76	5.82	-26.00	18.49	4.96	-0.41
SMB	-0.06	-0.14	2.81	-10.65	10.50	5.84	0.73
HML	0.43	0.67	2.22	-6.68	6.55	3.28	-0.35
WML	0.90	1.03	3.66	-17.73	7.98	6.63	-1.17
RF	0.03	0.00	0.08	0.00	0.44	17.13	3.87

3.5 The size adjusted Jensen measure

In 1994, Grinblatt and Titman suggested about the important of choosing the right benchmark to evaluate portfolio performance. They argued that small size firm effect was the main factor that lead to incorrect interpretation of investment portfolio performance. If there are considerable amount of small firm in the portfolio, the Jensen alpha performance measure might give bias interpretation.

As stated in the section 3.4, three classic asset pricing models are employed to evaluate the portfolio performance in this paper. Nonetheless, a modified Jensen's alpha measurement

is needed to mitigate a small-cap firm size bias problem. This model was used by Gregory et al. (1997) to mitigate small-cap firm bias problem in their model. Basically, the model would integrate small capitalization index in addition to the total market index in the standard Jensen's alpha model. The two-index model is specified below:

$$\boldsymbol{r_{i,t} - r_{f,t} = a_i + \beta_i \left(r_{m,t} - rf_{,t}\right) + \gamma_i (r_{s,t} - r_{m,t}) + \tau_{it}} \quad (4)$$

Where, $\boldsymbol{r_{s,t}}$ is the return of a small capitalization index (MSCI ASEAN Small Cap Index) and $\boldsymbol{\tau_{it}}$ is random error term. The assimilation of a small capitalization index could evaluate the influence of a small size firm existence in the portfolio.

Furthermore, the cross-sectional test will be performed to evaluate whether the small-cap size firms' effect differ between portfolio. The model is constructed as below:

$$\boldsymbol{r_{i,t} - r_{f,t} = a_i + \beta_i \left(r_{m,t} - rf_{,t}\right) + s_i SMB_{i,t} + h_i HML_{i,t} + w_i WML_{i.t} + \gamma_i (r_{s,t} - r_{m,t}) + \varepsilon_{it}} \quad (5)$$

This model is a modification of the Fama&French three factor model (1993), augmented by Carhart (1997). We absorb the gamma ($\boldsymbol{\gamma_i}$) variable from Gregory et al (1997) to give small-cap stock explanation power in our model.

CHAPTER 4 Result

4.1 High-Level and Low-Level portfolio performance

As described in section 3.5, this paper investigates the risk-adjusted return performance of ESG rated portfolio and the non-ESG rated matched conventional portfolio during different market condition (crisis and non-crisis) by using the Fama&French three-factor model, augmented by Carhart (1997) as the main asset pricing model. The constant on the model represents the return of the portfolio. During the regression process, there is a small number of ESG rated companies which impacts to the number of companies in each portfolio between 2006 and 2007 (see Table 3). To minimize the bias interpretation result, this paper only considers data from January 2008 to December 2016. The alpha estimates of the model for the High-Level and Low-Level portfolio from 2008 to 2016 is presented in Table 7 while, the regression results from January 2006 onwards is exhibited in the Appendix A.

The alpha estimates for High-Level and Low-Level ESG rated portfolio in full period outperform the non-ESG rated matched conventional portfolio. Additionally, the High-Level ESG portfolio outperform the market of 0.37%, while the peer matching portfolio economically and statistically underperform the market by significant negative alpha of -1.33%. On the other hand, the Low-Level ESG rated portfolio outperform the non-ESG rated matched portfolio. Whereas the Low-Level ESG portfolio underperform the market by showing economically and statistically insignificant negative alpha of -0.51%; while the peer matching portfolio underperform by exhibiting economically and statistically significant negative alpha of -1.06% at 10% level. Moreover, the comparison of alpha estimates in full sample period from the Fama&French three-factor models for both the ESG portfolios show that the model generates a positively insignificant alpha of 0.31% in High-Level ESG portfolio and negatively significant alpha of -0.53% in Low-Level ESG portfolio. The most important finding of the analysis of the alpha from High-Level and Low-Level ESG portfolio, is that the alpha difference from those portfolios is positive in all three different models which suggest that the High-Level ESG portfolio have a higher market risk-adjusted return than the Low-Level ESG portfolio, which is in line with Derwall et al. (2005) finding.

The return of the MSCI ASEAN index reflected the ASEAN's stock market's condition which was faced with a crisis from September 2008 to July 2009 (see Figure 2). It shows that there was a structural break in September 2008, and the Chow Test confirmed the structural break with the F distribution result which was at 0.002 below the F estimation of 7.695.

Table 7. High-Level, Low-Level and Sensitive Sector portfolio performance

This table shows the estimates alpha of performance from three ESG rated portfolios versus the matched non-ESG rated portfolios between 2008 and 2016. Our High-Level and Low-Level portfolio is created based on sorting ESG score from every company and classify them into five deciles portfolio. In addition, High-Level portfolio consists of a group of companies in first decile portfolio, while Low-Level portfolio consists of a group of companies in the last decile portfolio. Sensitive_Sec portfolio consists of a group of companies that operated in utilities sector, transportation industry, chemical industry, mining, oil and gas sector. For every companies in our sample portfolio, we put a sample of matched conventional companies for comparison. The CAPM alpha is regressed using the CAPM model. The FF3 alpha is regressed using the Fama&French three-factor model (1993), which amplifies the CAPM model with size and value factor. Carhart 4-factor Alpha is regressed using the Fama&French three-factor model augmented by Carhart (1997). Using MSCI ASEAN index monthly cumulative abnormal return calculation, we acknowledged that there was a structural break between September 2008 and July 2009. Based on that structural break we separated our sample into crisis (September 2008 – July 2009) and non-crisis (Augustus 2009 – December 2016). *, **, *** denotes that the independent variable is significant at the 10, 5, and 1 percent level respectively.

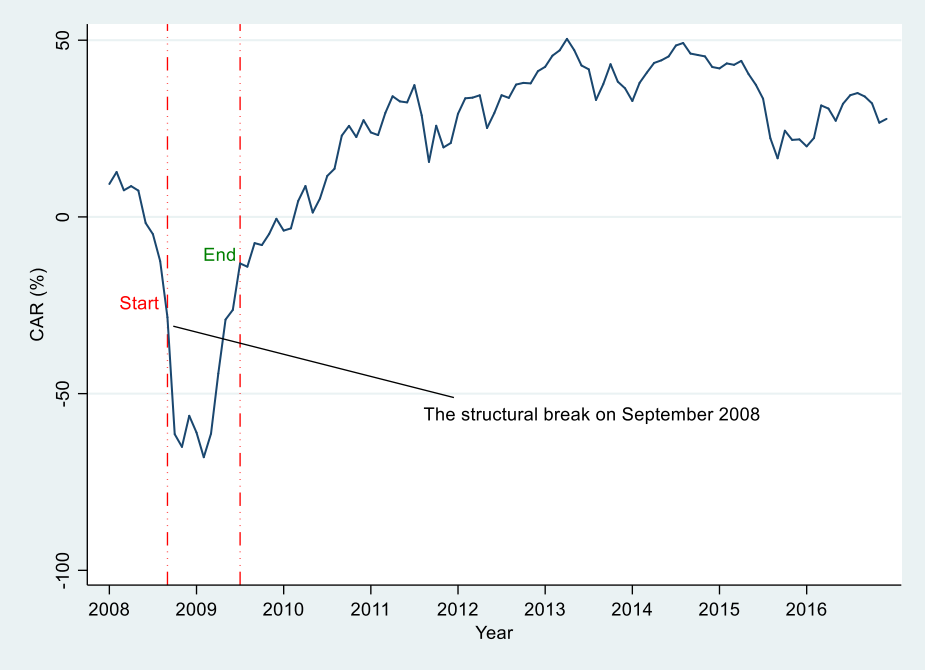
Portfolio	CAPM Alpha			FF3 Alpha			Carhart 4-Factor Alpha		
	FullPeriod	Crisis	Non-crisis	FullPeriod	Crisis	Non-crisis	FullPeriod	Crisis	Non-crisis
High-Level									
ESG	0.406	-0.248	0.671**	0.308	-0.279	0.569*	0.366	-0.390	0.561*
	(1.29)	(-0.23)	(2.25)	(1.00)	(-0.24)	(1.94)	(1.16)	(-0.17)	(1.77)
Conventional	-1.166***	-1.074	-1.003**	-1.328***	-1.856	-1.066**	-1.327***	-2.110	-1.075**
	(-2.85)	(-0.55)	(-2.40)	(-3.17)	(-0.85)	(-2.55)	(-2.93)	(-0.68)	(-2.12)
Diff	1.572	0.826	1.674	1.636	1.577	1.635	1.693	1.720	1.636
Low-Level									
ESG	-0.504	-1.274	-0.170	-0.532*	-1.338	-0.262	-0.508	0.633	-0.208
	(-1.58)	(-0.87)	(-0.81)	(-1.84)	(-0.93)	(-1.25)	(-1.65)	(0.39)	(-0.94)
Conventional	-1.010*	-5.250	0.111	-1.002*	-4.842	-0.029	-1.059*	-0.318	0.060
	(-1.69)	(-1.29)	(0.37)	(-1.86)	(-1.22)	(-0.10)	(-1.83)	(-0.15)	(0.19)
Diff	0.506	3.976	-0.281	0.470	3.504	-0.233	0.551	0.951	-0.268
Sensitive_Sec									
ESG	-0.600	-1.598	-0.291	-0.625	-1.120	-0.486	-0.613	1.829	-0.387
	(-1.50)	(-0.79)	(-0.87)	(-1.63)	(-0.54)	(-1.39)	(-1.48)	(0.98)	(-0.98)
Conventional	-0.670	-2.295	-0.406	-0.645	-1.681	-0.605	-0.606	3.251	-0.100
	(-1.50)	(-1.03)	(-0.94)	(-1.47)	(-0.71)	(-1.44)	(-1.31)	(1.29)	(-0.22)
Diff	0.070	0.697	0.115	0.020	0.561	0.119	-0.007	-1.422	-0.287

During crisis period, both of High-Level and Low-Level ESG rated portfolio outperform non-ESG rated matched portfolio. Nevertheless, only the Low-Level ESG rated portfolio performs positively of 0.63% using the Fama&French four-factor model. Note that none of non-ESG rated matched portfolios generate positive alpha during crisis period across all models. Furthermore, the High-Level ESG rated portfolio in average outperform Low-Level ESG rated portfolio in the crisis depending on the asset pricing model. However, we find that the High-Level ESG portfolio underperform the Low-Level ESG portfolio in the Fama&French

four-factor model. Thus, we could not assure that ESG rated portfolio outperforms non-ESG rated portfolio in the market downturn.

Figure 2. The ASEAN crisis structural b`reak

The graph below depicts the structural break of the financial crisis in ASEAN as an impact of the Global Financial Crisis in 2008. The vertical axis shows the percentage cumulative abnormal return of the MSCI ASEAN index and horizontal axis shows time period of observation from 2008 to 2016. The red dash line separates the crisis period.



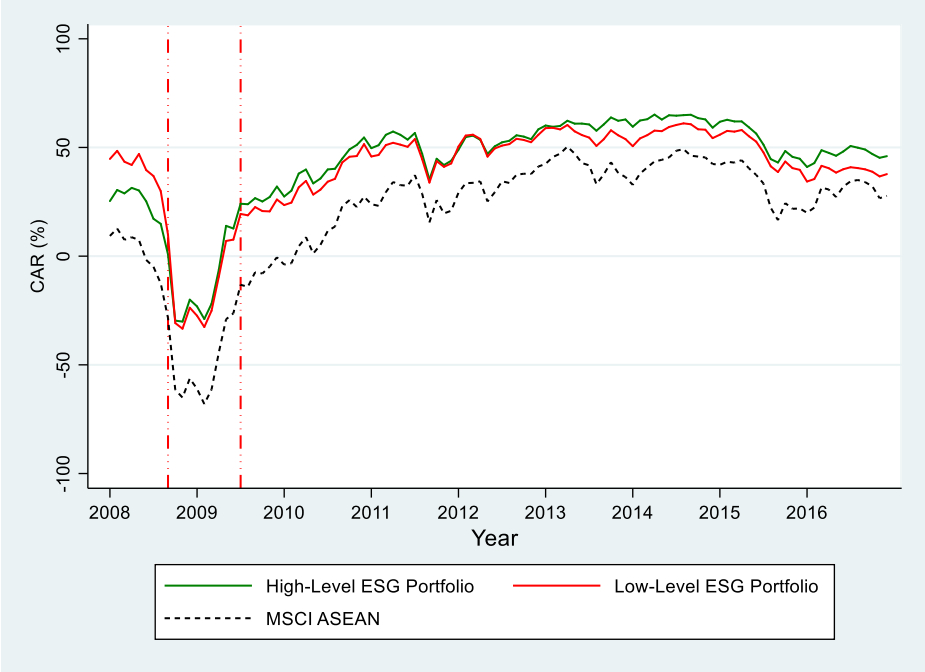
After the crisis period, the High-Level ESG portfolio generates a significant positive alpha at 10% level and outperforms the non-ESG rated matched conventional portfolio at a range of 0.56% to 0.67% depending on the asset pricing models. On the contrary, the Low-Level ESG portfolio performs negative alpha at a range of -0.17% to -0.26% depending on the asset pricing model, yet underperforms the non-ESG rated matched conventional portfolio.

Furthermore, when examining the risk adjusted performance (alpha) in Fama&French four factors model, the multifactor loading on the ESG rated portfolio and the non-ESG rated matched portfolio explain the different styles of investing. Table 9 exhibits the differences between the High-Level ESG rated portfolio and the non-ESG matched conventional portfolio. During the full sample period, the High-Level ESG rated portfolios are significantly more coincided with the market factor and are less exposed to the SMB factor than their peer matched conventional portfolio. While, during crisis period, the High-Level ESG rated portfolio has lower negative correlation with value factor and momentum factors than their peer non-ESG

rated matched conventional portfolio. The High-Level ESG portfolio has negative SMB coefficients at -0.002%, while the Low-Level ESG portfolio has a positive SMB coefficient at 0.47% during crisis period. In non-crisis period, the High-Level ESG portfolio has a positive and significant correlation with growth factor during non-crisis period. Compared with the non-ESG rated matched peers, the ESG rated portfolio has lower SMB coefficient which suggests a bias with the large capitalization stocks (Derwall et al. (2005); Nofsinger et al. (2014)). Moreover, the Low-Level ESG portfolios have positive coefficient with SMB factor in every different market condition, and higher than High-Level ESG portfolio, which means that the Low-Level ESG rated portfolio is value stock company oriented, while the High-Level ESG portfolio is growth stock company oriented in all different market states. Overall, these interpretations show that risk exposure do not only depend on market conditions and but also on ESG screening, which method presents different risk exposures across different market sequences.

Figure 3. High-Level and Low-Level portfolio performance

The graph below depicts the performance of the High-Level and Low-Level ESG portfolio. The vertical axis shows the percentage cumulative abnormal return of the ESG portfolios and the MSCI index. Horizontal axis shows time period of observation from 2008 to 2016. The red dash line separates the crisis period.



4.2 Sensitive sector portfolio performance

The last section in Table 7 depicts the alpha performance for the portfolio from companies which operated in sensitive industries. Using the Fama&French four-factor model, The Sensitive Sector ESG portfolio underperforms the market by a negative insignificant return at -0.61% in the full period regression, in contrast with Derwall et al. (2005) who obtained a superior significant return for their sensitive sector portfolio. After differentiating the time series analysis into crisis and non-crisis periods, we find that the Sensitive Sector ESG portfolio outperforms the market with positive insignificant alpha at 1.83% in the crisis period and underperforms with negative insignificant alpha during non-crisis period at -0.39%. Even though we employ two other asset pricing models, we find less likely the same alpha result.

We also observe that the peer matched conventional portfolio outperforms the Sensitive_Sec ESG rated portfolios in every market condition. Unexpectedly, they generate positive insignificant result at 3.25% during the crisis period. Using the CAPM and Fama&French three factor model, we find that the Sensitive Sector ESG portfolio outperform its non-ESG rated matched conventional portfolio.

These findings, however also remained an important investment puzzle discussion as the next question arises whether it is appropriate for the SRI investors to rely on these ratings, which have become the benchmark for reviewing environment friendly companies. There are many speculative interpretations of the aforementioned result, particularly from the ASEAN market structure. Nonetheless, this paper limits its interpretation based on the regression model which is implied. The result shows that both the ESG and the non-ESG rated sensitive portfolios have positive significant correlations with the market exposure, and the ESG portfolio has a higher correlation than the non-ESG rated portfolio in every market conditions (see Table 9), which means the alpha changes simultaneously with the market factor. Moreover, factor loading in Fama&French four factor model shows that the non-ESG rated matched conventional portfolio has positive and significant SMB coefficient of 0.66% at 10% level in the crisis period and positive and significant HML coefficient of 0.51% at 5% level in the non-crisis period higher than ESG rated portfolio. It makes sense why they outperform the Sensitive_Sec ESG portfolio. Because of the value stock tend to outperform during market downturn, while growth stock tends to outperform during stable market condition (Fama&French, 1993).

Another alternative explanation is mispricing theory. We presume the companies which have good ESG rating in environmental are not mispriced in every market condition particularly in the crisis period, when stock market becomes more volatile. The Sensitive Sector ESG rated portfolio seems to be more stable, and the price is near to its fundamental value compared with non-ESG matched conventional portfolio which outperfoms during crisis period at 3.25%. It is possible that ESG rated companies have more exposed information to the market player so that the investor who invest in the companies with ESG rating particularly which operate in the environmental sensitive sector are more reasonable and have sufficient information as their investment reasoning.

4.3 Portfolio performance: Best in class strategy

In the beginning of SRI investment era, the SRI investor defines their SRI portfolios as the portfolio that does not contain stock from the companies that operated in unethical sectors. This simple screening method is well known as negative screening method. The rapid growth of SRI investment instrument has made the screening process more complex. In the modern era of SRI investment, the investor screens their SRI portfolio with multiple screening methods namely negative screening, positive screening and best-in-class approach (Kreibohm, 2016). Firstly, the negative screening asses the companies based on their participation in unethical business. Second, the positive screening evaluates the SRI portfolio based on positive ESG features of the company such as corporate policy practice, environment practice and social practice (Schueth, 2003). Finally, the best-in-class strategy is the type of screen process that select the companies that are the leaders in their industry. The companies need to pass several threshold levels to be picked in the best-in-class portfolio. (Kreibohm, 2016; Derwall et al. (2005)).

Table 8 below depicts for the alpha generated regression for the matched three best-in-class SRI portfolios. As described in section 3.3.3, we implement best in class strategy based on three thematic portfolios which represent the three pillars of ESG rating.

The first section in the table shows the estimates alpha of the Environmental matched portfolio. We observe that the ESG environment portfolio underperforms the peer matched conventional portfolios in the full period regression, the ESG rated portfolio underperform the market at -0.23%, while the non-ESG rated portfolio outperform the market at 0.13% during a full period regression, which means that the ESG rated companies with the same date, size and sector, yields a lower risk- adjusted return than its peer matched conventional portfolio. Using

different market condition sequences, we note that the ESG environment portfolio (-0.29%) underperform the non-ESG rated matched conventional portfolio (0.06%). Moreover, the Environment ESG portfolio underperform (0.07%) the non-ESG rated matched conventional portfolio (0.19%) during non-crisis period.

The second section of the table 8 shows the estimates alpha of the Social matched portfolio. We find that the Social ESG portfolio outperforms the peer matched conventional portfolio during the market crisis. The ESG rated portfolio outperform in a range of 0.11% to 0.57% depending on the asset pricing models, while the non-ESG rated portfolio underperform in a range of -1.63% to -4.25% depending on the asset pricing models, which means that the ESG rated companies with the same date, size and sector, yields a better risk-adjusted return than its matched peer conventional portfolio in market downturn period. Using different market condition sequences, we note that the Social ESG portfolio outperforms the non-ESG rated matched conventional portfolio during non-crisis period.

Whereas, the third section of the table shows the estimates alpha of the total matched portfolio. It is observed that the ESG total portfolio outperforms the matched conventional peer portfolio in the full period regression. Moreover, the ESG rated portfolio generate alpha in a range of -0.20% to -0.26% depending on asset pricing model, while the non-ESG rated portfolio generate alpha in a range of -0.46% to -0.58% depending on asset pricing model during full period regression, which mean that the ESG rated companies with the same date, size and sector, yields a better risk-adjusted return than its matched peer conventional portfolio. While, using different market condition sequences, it suggests that the ESG total portfolio (0.37%) outperform matched non-ESG rated peer conventional portfolio (-1.13%) during the crisis period. Moreover, the total ESG portfolio slightly underperform than its matched non-ESG rated peer conventional portfolio.

After implementing the best-in-class screening process on ESG portfolios stock picking strategy, we note that the Social and the Total ESG portfolios generate higher risk-adjusted return and outperform their non-ESG rated matched conventional portfolios in the market downturn period.

Table 8. The best-in-class portfolio performance

This table shows that estimates alpha performance from three thematic best-in-class ESG rated portfolios (the Environment, the Social and the Total) versus non-ESG rated matched portfolios between 2008 and 2016. For every company in our sample portfolio, we put a sample of matched conventional companies as comparison. The CAPM alpha is regressed using the CAPM model. The FF3 alpha is regressed using the Fama&French three factor model (1993), which amplifies the CAPM model with size and value factor. The Carhart 4-factor Alpha is regressed using the Fama&French three-factor model augmented by Carhart (1997). Using MSCI ASEAN index monthly historical return, we acknowledged that there was a structural break between September 2008 and July 2009. Based on that structural break we separated our sample into crisis (September 2008 – July 2009) and non-crisis (Augustus 2009 – December 2016). *, **, *** denotes that the independent variable is significant at the 10, 5, and 1 percent level respectively.

Portfolio	CAPM Alpha			FF3 Alpha			Carhart 4-Factor Alpha		
	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis
Environment									
ESG	-0.159	-1.749	0.194	-0.229	-1.823	0.015	-0.233	-0.290	0.074
	(-0.48)	(-1.01)	(0.74)	(-0.70)	(-0.86)	(0.06)	(-0.65)	(-0.21)	(0.25)
Conventional	0.159	-0.784	0.366	0.113	-0.056	0.149	0.129	0.060	0.192
	(0.45)	(-0.67)	(0.95)	(0.32)	(-0.06)	(0.38)	(0.35)	(0.09)	(0.48)
Diff	-0.318	-0.965	-0.172	-0.342	-1.767	-0.134	-0.362	-0.350	-0.118
Social									
ESG	-0.188	0.566	-0.090	-0.247	0.105	-0.158	-0.205	0.368	-0.195
	(-0.69)	-0.50	(-0.41)	(-0.96)	(0.11)	(-0.72)	(-0.76)	(0.23)	(-0.84)
Conventional	-0.692*	-1.632	-0.429	-0.823**	-2.020	-0.513	-0.770**	-4.253**	-0.349
	(-1.78)	(-1.04)	(-1.03)	(-2.13)	(-1.28)	(-1.22)	(-1.99)	(-2.62)	(-0.84)
Diff	0.504	2.198	0.339	0.576	2.125	0.355	0.565	4.621	0.154
Total									
ESG	-0.198	0.566	-0.105	-0.262	0.105	-0.183	-0.224	0.368	-0.222
	(-0.72)	(0.50)	(-0.47)	(-1.03)	(0.11)	(-0.82)	(-0.83)	(0.23)	(-0.93)
Conventional	-0.582	-0.408	-0.408	-0.529	-0.361	-0.347	-0.455	-1.130	-0.219
	(-1.36)	(-0.26)	(-0.87)	(-1.22)	(-0.24)	(-0.74)	(-1.04)	(-0.47)	(-0.44)
Diff	0.384	0.974	0.303	0.267	0.466	0.164	0.231	1.498	-0.003

4.4 The small-cap size bias test.

The two-factor and cross-sectional tests below are needed to support our classical asset pricing test result. The additional gamma variable could reduce small-cap size bias problem (Gregory et al. 1997; Liljeblom et al. 2000; Kreander et al. (2005) in the portfolio that contains considerable number of small-cap companies.

4.4.1 The two-factor test

Using the modified Jensen alpha measurement as the additional benchmark return should eliminate small-cap firm size bias in our portfolios. The column five in Table 10 shows that two of six Gamma coefficients of the ESG portfolios are significantly positive in the gamma

Table 9. Factor loading for Fama&French four factor model

This table depicts the coefficients estimates from Fama&French three-factor model (1993), augmented by Carhart (1997) which categorized the market sequences (Full Period

Portfolio	Alpha			MKT			SMB			HML			WML			Adj R-sq		
	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis	Full Period	Crisis	Non-crisis
High Level																		
ESG	0.366	-0.390	0.561*	0.736***	0.968***	0.544***	0.063	-0.002	-0.093	0.229*	0.026	0.246*	-0.077	-0.026	0.007	0.707	0.905	0.508
Conventional	-1.327***	-2.110	-1.075**	0.653***	0.675***	0.667***	0.134	-0.240	0.197	0.415**	0.657	0.155	-0.001	-0.060	0.008	0.511	0.555	0.404
Low Level																		
ESG	-0.508	0.633	-0.208	0.833***	1.256***	0.600***	0.294*	0.473	0.047	0.164*	-0.004	0.226*	-0.032	0.465	-0.048	0.785	0.915	0.720
Conventional	-1.059*	-0.318	0.060	0.722***	1.157	0.521***	0.401	1.402	0.117	0.147	-0.489	0.344**	0.077	1.068	-0.080	0.435	0.458	0.488
Sensitive_Sec																		
ESG	-0.613	1.829	-0.387	0.932***	1.364***	0.758***	0.279	0.527	0.136	0.157	-0.451	0.477**	-0.015	0.696	-0.089	0.730	0.873	0.651
Conventional	-0.606	3.251	-0.100	0.787***	1.294***	0.726***	0.294	0.656*	0.352	0.041	-0.581**	0.513**	-0.052	1.165***	-0.451***	0.596	0.902	0.536
Environment																		
ESG	-0.233	-0.290	0.074	0.648***	0.865***	0.486***	0.265	0.857	-0.005	0.258	-0.034	0.436***	0.006	0.362	-0.053	0.646	0.810	0.544
Conventional	0.129	0.060	0.192	0.572***	0.720***	0.519***	0.066	-0.151	0.102	0.123	-0.573**	0.527**	-0.022	0.028	-0.039	0.516	0.896	0.372
Social																		
ESG	-0.205	0.368	-0.195	0.735***	0.969***	0.553***	0.218*	0.361	0.003	0.202*	0.334	0.162	-0.055	0.062	0.033	0.779	0.932	0.660
Conventional	-0.770**	-4.253**	-0.349	0.706***	0.349**	0.791***	0.010	-0.077	0.099	0.271*	0.388*	0.213	-0.069	-0.582*	-0.147	0.580	0.729	0.522
Total																		
ESG	-0.224	0.368	-0.222	0.741***	0.969***	0.563***	0.215*	0.361	0.005	0.216**	0.334	0.186	-0.052	0.062	0.035	0.782	0.932	0.667
Conventional	-0.455	-1.130	-0.219	0.586***	0.538**	0.624***	0.278**	0.034	0.368**	-0.037	-0.039	-0.138	-0.100	-0.182	-0.114	0.477	0.626	0.359

(January 2008 – December 2016), Crisis (September 2008 – July 2009) and Non-crisis (Augustus 2009 – December 2016)). MKT represents the excess market return, SMB represent size factor, HML represents value factor and WML represents momentum factor. *, **, *** denotes that the independent variables are significant at the 10, 5, and 1 percent level respectively.

coefficient. The High-Level ESG portfolio is significant at the 1% level and the Environment ESG portfolio is significant at the 5% level. On the other hand, the adjusted R^2 is higher for those regression, and the increase is quite large than using the ordinary Jensen measurement. Overall, the mean of the all ESG portfolios adjusted R^2 improves from 72.8% in the ordinary Jensen measurement to 73.5% in the adjusted Jensen measurement. However, compared with ordinary Jensen measurement, the result shows small improvement in the alphas of the adjustment Jensen measurement. The result is similar with Gregory et al. (1997) finding which conclude that the ethical funds or SRI instruments are most likely neutral from small-cap size bias.

From the non-ESG rated portfolio evaluation, we can see that the non-ESG portfolios suffered small-cap firm size bias. The evidence from the regression result shows that five out of the six Gamma coefficients are positively significant. The Sensitive_Sec and the Total non-ESG rated portfolios are significant at 1% level. Moreover, the High-Level and Low-Level non-ESG rated portfolios are significant at 5% level. While the Environment portfolios is significant at 10% level. In contrast with Gregory et al. (1997) who obtained significantly negative correlation in the UK non-ethical unit trusts gamma coefficient, the test result for the ASEAN non-ESG rated matched portfolio shows significantly positive result.

As the alphas do not significantly change for both ESG and non-ESG rated portfolios, the adjustment Jensen model (two factor model) is more valid benchmark to evaluate the performance of non-ESG rated portfolio. whether or not exposure to the small-cap firm bias still exist in our portfolios. In addition, by including the gamma variable as an explanatory variable, we believe that it will increase the validity of our portfolio performance analysis.

Table 11 shows the full period cross-sectional regression result. Generally, small-cap size bias permanently exists in the non-ESG matched portfolio. Specifically, the full period regression highlights several points. First, we find that the alphas from cross sectional regression are mixed: three of six the ESG portfolios and four of six the non-ESG matched portfolios generated lower performance than using the normal Fama&French four-factor model, and the significant level of the Social non-ESG matched portfolio alpha move from 5% level to 10% level. Second, the Social and the Total non-ESG matched portfolios have negative correlation with the gamma, while in the adjusted Jensen alpha model generate oppositely. Fourth, the R^2 in the cross-sectional model improves compared with the adjusted Jensen alpha model and the Fama&French four-factor model.

Table 10. The adjusted Jensen alpha measurement

This table shows the comparison of the adjusted Jensen alpha measurement versus the normal Jensen alpha measurement from the ESG rated portfolios and the non-ESG rated matched portfolios between 2008 and 2016. The Beta consists of excess market return ($r_{i,t} - r_{f,t}$). Gamma consists of the monthly return of MSCI ASEAN small-cap index minus the monthly return of market index benchmark ($r_{s,t} - r_{m,t}$). Alpha consists of the constant from regression. *, **, *** denotes that the independent variable is significant at the 10, 5, and 1 percent level respectively.

Portfolio	Model 1			Model 2			
	Beta	*Alpha (Jensen Measure)*	*Adj R-sq*	*Beta*	*Gamma*	*Alpha (Adjusted Jensen Measure)*	*Adj R-sq*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
High-Level							
ESG	0.741***	0.406	0.702	0.845***	0.136***	0.428	0.732
	(11.93)	(1.29)		(14.11)	(3.86)	(1.43)	
Conventional	0.640***	-1.166***	0.497	0.723***	0.108**	-1.149***	0.512
	(10.08)	(-2.85)		(9.82)	(2.16)	(-2.84)	
Low-Level							
ESG	0.856***	-0.504	0.773	0.886***	0.038	-0.498	0.773
	(7.88)	(-1.58)		(6.79)	(0.81)	(-1.58)	
Conventional	0.738***	-1.010*	0.427	0.890***	0.198**	-0.978*	0.464
	(3.17)	(-1.69)		(3.22)	(2.11)	(-1.72)	
Sensitive_Sec							
ESG	0.952***	-0.600	0.726	0.973***	0.027	-0.595	0.724
	(7.60)	(-1.50)		(6.42)	(0.51)	(-1.50)	
Conventional	0.821***	-0.670	0.593	0.940***	0.154***	-0.646	0.618
	(7.62)	(-1.50)		(7.58)	(2.72)	(-1.50)	
Environment							
ESG	0.656***	-0.159	0.630	0.736***	0.104**	-0.142	0.648
	(6.81)	(-0.48)		(6.96)	(2.49)	(-0.44)	
Conventional	0.574***	0.159	0.526	0.629***	0.0714*	0.170	0.533
	(8.11)	(0.45)		(7.70)	(1.69)	(0.49)	
Social							
ESG	0.752***	-0.188	0.767	0.758***	0.008	-0.187	0.765
	(10.01)	(-0.69)		(8.07)	(0.17)	(-0.68)	
Conventional	0.705***	-0.692*	0.577	0.726***	0.029	-0.691*	0.574
	(10.66)	(-1.78)		(9.04)	(0.56)	(-1.77)	
Total							
ESG	0.757***	-0.198	0.770	0.761***	0.006	-0.197	0.768
	(10.14)	(-0.72)		(8.16)	(0.14)	(-0.72)	
Conventional	0.632***	-0.582	0.470	0.753***	0.157***	-0.557	0.505
	(8.46)	(-1.36)		(8.99)	(2.90)	(-1.34)	

Next, we separate the regression between crisis and non-crisis period (see Table 12). We find major improvement in crisis period R^2 for overall non-ESG matched portfolios from the mean of 69.4% to 76.6%. Nonetheless, the small-cap firm size bias seems to be neutral from the non-ESG matched portfolios. Moreover, the over and underperformance conclusion between ESG and non-ESG rated portfolio in reference to the previous section (see section 4.1,

4.2 and 4.3) do not change. The alphas that are generated using cross-sectional model do not differ significantly than using the Fama&French four-factor model.

While, in the non-crisis period regression result for the cross-sectional model exhibits mix finding. First, the High-Level ESG portfolio generates lower alpha in the non-crisis period cross-sectional model than using the Fama&French four-factor model from positive significant 0.56% at 10% significant level to positive insignificant 0.52%, but constantly outperforms its peer non-ESG

Table 11. The full period cross-sectional regression result

This table shows the full period of the modified Fama&French four-factor (cross-sectional) model regression result from the ESG rated portfolios and the non-ESG rated matched portfolios between 2008 and 2016. MKT represents the excess market return, SMB represents size factor, HML represents value factor and WML represents momentum factor. Gamma consists of the monthly return of MSCI ASEAN small-cap index minus the monthly return of market index benchmark ($\boldsymbol{r_{s,t} - r_{m,t}}$). *, **, *** denote that the independent variable is significant at the 10, 5, and 1 percent level respectively.

Portfolio	Alpha	MKT	SMB	HML	WML	Gamma	Adj R-sq
High Level							
ESG	0.362	0.851***	-0.008	0.238*	-0.062	0.138***	0.737
Conventional	-1.330***	0.744***	0.078	0.422**	0.011	0.109**	0.526
Low Level							
ESG	-0.508	0.850***	0.284*	0.166*	-0.030	0.020	0.784
Conventional	-1.065*	0.874***	0.308	0.158	0.098	0.182**	0.464
Sensitive_Sec							
ESG	-0.614	0.941***	0.274	0.158	-0.014	0.010	0.728
Conventional	-0.610	0.903***	0.224	0.050	-0.036	0.138**	0.615
Environment							
ESG	-0.236	0.726***	0.217	0.264*	0.017	0.0928**	0.659
Conventional	0.127	0.631***	0.030	0.127	-0.013	0.0706*	0.522
Social							
ESG	-0.205	0.729***	0.221*	0.202*	-0.056	-0.007	0.777
Conventional	-0.763*	0.731***	-0.007	0.266*	-0.077	0.033	0.578
Total							
ESG	-0.223	0.734***	0.219*	0.215**	-0.053	-0.008	0.780
Conventional	-0.459	0.704***	0.207*	-0.028	-0.084	0.140**	0.503

matched portfolio. Moreover, the Total portfolio turn outperforms its peer non-ESG matched portfolio in the cross-sectional model. Overall, the non-ESG matched portfolios generate lower alpha than using the Fama&French four-factor model. Second, we also see that only two of six non-ESG matched portfolio suffer from small-cap firm size bias in non-crisis period.

In a nutshell, we could firmly argue that small-cap size bias problem for both of ESG and non-ESG rated portfolios have been eliminated by applying the additional gamma variable in our cross-sectional model.

4.5 Robustness check

As this paper uses the robust time series regression, the author applies robust standard error in regression process. Moreover, to check stationarity between variables, the unit root test is utilized, and the autocorrelation test is implemented to check the repeating pattern in our model. Both robustness tests confirm that the model is clear from those two problems.

Table 12. The cross-sectional regression result (crisis and non-crisis)

This table shows the modified Fama&French four factor (cross-sectional) model regression result from the ESG rated portfolios and the matched non-ESG rated portfolios between 2008 and 2016. MKT represents the excess market return during crisis and non-crisis period, SMB represents size factor, HML represents value factor and WML represents momentum factor. Gamma consists of the monthly return of MSCI ASEAN small-cap index minus the monthly return of market index benchmark ($r_{s,t} - r_{m,t}$). *, **, *** denote that the independent variable is significant at the 10, 5, and 1 percent level respectively.

Portfolio	Alpha		MKT		SMB		HML		WML		Gamma		Adj R-sq	
	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis	Crisis	Non-crisis
High Level														
ESG	-0.135	0.515	1.072***	0.650***	-0.205	-0.121	0.103	0.232	-0.033	0.010	0.136	0.108**	0.934	0.528
Conventional	-1.579	-1.083**	0.891***	0.684***	-0.661	0.193	0.818**	0.153	-0.073	0.008	0.283**	0.017	0.837	0.397
Low Level														
ESG	0.546	-0.201	1.221***	0.584***	0.541	0.051	-0.030	0.228*	0.468	-0.049	-0.046	-0.017	0.901	0.717
Conventional	-0.195	0.015	1.207	0.623***	1.304	0.090	-0.452	0.330**	1.065	-0.076	0.065	0.104*	0.355	0.506
Sensitive_Sec														
ESG	1.717	-0.375	1.318***	0.731***	0.616	0.143	-0.485	0.481**	0.699	-0.089	-0.060	-0.027	0.853	0.648
Conventional	3.479	-0.139	1.387***	0.814***	0.475	0.329	-0.511*	0.501**	1.159***	-0.448***	0.122	0.090	0.914	0.539
Environment														
ESG	-0.161	0.064	0.918***	0.509***	0.755	-0.011	0.006	0.433***	0.359	-0.052	0.069	0.023	0.785	0.540
Conventional	-0.009	0.135	0.691***	0.647***	-0.096	0.068	-0.594**	0.510**	0.029	-0.035	-0.037	0.131*	0.881	0.394
Social														
ESG	0.254	-0.188	0.923***	0.537***	0.451	0.007	0.300	0.164	0.065	0.033	-0.060	-0.016	0.927	0.657
Conventional	-5.154*	-0.355	0.409*	0.805***	-0.389	0.096	0.433	0.212	-0.850**	-0.146	0.172	0.014	0.816	0.517
Total														
ESG	0.254	-0.214	0.923***	0.545***	0.451	0.010	0.300	0.188	0.065	0.035	-0.060	-0.019	0.927	0.664
Conventional	-0.730	-0.273	0.701**	0.748***	-0.283	0.336**	0.082	-0.155	-0.192	-0.110	0.213*	0.126	0.793	0.369

CHAPTER 5 Conclusion and Limitation

5.1 Conclusion

The majority of academic papers have been focussed on analysing the SRI practice in the developed western countries. Nevertheless, emerging market particularly the ASEAN countries' members which start to develop investment product based on the SRI doctrine are not well studied yet. This paper provides evidence that on average, the companies in the ASEAN region which have ESG score outperform the companies which do not have ESG score during crisis period. However, only the companies that have a high ESG score provide higher risk- adjustment return than its matched portfolio in every market sequence.

Utilizing the classical Fama&French three factors model (1993), augmented by Carhart (1997), we have to reject the first hypothesis. Because of the high ESG score underperform the low ESG score companies in the market crisis. Moreover, the High-Level ESG rated portfolios create a negative alpha in the market downturn period, while the Low-Level ESG rated portfolio performs positively in crisis period. In comparison with their matched conventional peer, only the High-Level ESG rated portfolio outperforms its matched conventional peers in all market condition.

The second hypothesis argues that best-in-class ESG rated portfolios outperform the non ESG matched portfolio, and it also should be rejected. It is clear that only the Social ESG portfolio outperform than its matched portfolio in all market circumstances. However, it could be suggested that the investors in the ASEAN stock market is possible to obtain a higher financial return in market downturn condition by holding the portfolios which consist of the stock characteristic in the Social best-in-class portfolio.

In our SRI paper, the small-cap firm effect plays an important role to explain performance of our matched ESG portfolios analysis. It seems to be the case that the non-ESG rated portfolios have a higher exposure to the small-cap firm effect than the ESG rated portfolios. It is clear that the standard CAPM model will have higher downward bias when assessing non-ESG rated portfolios performance than it will when assessing ESG rated portfolios. The cross-sectional regression by adding adjusted Jensen alpha as an explanatory variable increase the validity of our regression result. However, the performance result does not change significantly.

Overall, the finding shows a positive perk when considering ESG score in the investment decision making process. The cross-sectional regression model could well explain the comparison of historical ESG portfolio with the non-ESG portfolio performance in different market chronologies and eliminate small-cap firm effect.

5.2 Limitation

This paper present the results suggesting that a convergence between ESG rated and non-ESG rated companies is materializing, supporting the view that SRI investment is on the verge of going mainstream. With the motivation to give a new evidence to SRI study; this paper is pioneering to investigate SRI equity performance in the Southeast Asia region.

This study is performed in several Southeast Asia countries, which are relatively new for SRI investment. Because of that not all firms are rated by ESG rating agency. Comparably with western countries such as the U.S. and European countries which have developed SRI market and have more companies that are rated by ESG rating agency. While, based on the trend growth that we see in chapter two, more companies in the Southeast Asian region will have ESG rating in the future. For the future research, we suggest to use more than one ESG rating source named Morningstar and Bloomberg. So, the objectivity of the performance result could be increased.

On the other hand, because of less transparency and opacity of the Southeast Asia market compared with the U.S. market, the Fama&French four-factor model does not perform well in the Southeast Asia market. The MSCI ASEAN small-cap index that is added in the cross-sectional model only eliminate small-cap size firm bias problem, but might be not enough to explain local factor investment. One of the suggested improvements to the future research is by going deep into the country level performance analysis and add country specific benchmark in the regression model. (Bauer et al. 2005)

Another suggestion is by using the Fama&French five-factor model for portfolio performance analysis. Chiah et al. (2016) suggested that the Fama&French five-factor model have more explanatory power in examining asset pricing anomalies than others asset pricing model. It might be interesting for future study to use the Fama&French five-factor model with longer time horizon.

Lastly, the emerging market particularly the ASEAN region flourished stock market as the economic benchmark. Inadequate market regulation and unmatured investor could lead to

mispricing in the ASEAN stock markets. Therefore, we encourage future research to focus on mispricing hypothesis and investing behaviour in longer period.

REFERENCES

Acharya, V. V., Pedersen, L. H., Philippon, T., & Richardson, M. (2010). Measuring systemic risk. *The Review of Financial Studies*, *30*(1), 2–47.

Asian Development Bank (ADB). (2017). Catalyzing Green Finance – A Concept for Leveraging Blended Finance for Green Development. https://www.adb.org/publications/green-finance-catalyzing-facility

Auer, B. R., & Schuhmacher, F. (2016). Do socially (ir)responsible investments pay? New evidence from international ESG data. *The Quarterly Review of Economics and Finance*, *59*, 51-62.

Bauer, R., Otten, R., & Rad, A. T. (2006). Ethical investing in Australia: Is there a financial penalty? *Pacific-Basin Finance Journal*, *14*, 33–48.

Baughn, C. C., Bodie, N. L., & McIntosh, J. C. (2007). Corporate Social and Environmental Responsibility in Asian Countries and Other Geographical Regions. Corporate Social Responsibility and Environmental Management, *14*, 189-205.

Becchetti, L., Ciciretti, R., Dalò, A., & Herzel, S. (2015). Socially responsible and conventional investment funds: Performance comparison and the global financial crisis. *Applied Economics*, *47*(25), 2541–2562.

Benson, K. L., & Humphrey, J. E. (2008). Socially responsible investment funds: Investor reaction to current and past returns. *Journal of Banking & Finance*, *32*, 1850–1859.

Berkhout, F., Verbong, G., Wieczorek, A. J., Raven, R., Lebel, L., & Bai, X. (2010). Sustainability experiments in Asia: innovations shaping alternative development pathways? *Environmental Science & Policy*, *13*, 261-271.

Borgers, A., Derwall, J., Koedijk, K., & Horst, J. T. (2013). Stakeholder relations and stock returns: On errors in investors' expectations and learning. *Journal of Empirical Finance*, *22*, 159 – 175.

Bollen, N. P. (2007). Mutual fund attributes and investor behavior. *Journal of Financial and Quantitative Analysis*, *42*, 683–708.

Blaauwgeers, L. (2016). Impact investing in public equities: An analysis of financial and impact performance. *Erasmus University Rotterdam*.

Carhart, M., 1997, On persistence in mutual fund performance, *Journal of Finance, 52*, 57-82.

Chapple, W., & Moon, J. (2007). Introduction: CSR Agendas for Asia. *Corporate Social Responsibility and Environmental Management*, *14*, 183-188.

Cheung, Y. L., Tan, W., Ahn, H.-J., & Zhang, Z. (2010). Does Corporate Social Responsibility Matter in Asian Emerging Markets? *Journal of Business Ethics*, *92*(3), 401-413.

Chen, M.-C., & Lee, C.-F. (2016). A Better Model? An Empirical Investigation of the Fama-French Five-Factor Model in Australia. *International Review of Finance, 16*(4), 595-638.

Chiah, M., Chai, D., Zhong, A., & Li, S. (2016). The Effect of Corporate Social Responsibility on Equity Fund Returs: Evidence from China. *International Journal of Economics and Finance, 8*(10).

Climent, F., & Soriano, P. (2011). Green and good? The investment performance of US environmental mutual funds. *Journal of Business Ethics, 103,* 275–287.

Cornell, B., & Shapiro, A. (1987). Corporate stakeholders and corporate finance. *Financial Management, 16*(1), 5–14.

Eichholtz, P., Kok, N., & Yonder, E. (2012). Portfolio greenness and the financial performance of REITs. *Journal of International Money and Finance, 31*(7), 1911–1929.

Faff, R. (2004). A simple test of the Fama and French model using daily data: Australian evidence. *Applied Financial Economics*, *14*(2), 83–92.

Fama, E., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*, 3–53.

Fama, E., & French, K. R. (2011). Size, value and momentum in international stock returns. *Journal of Financial Economics*. *105*(3), 457-472.

Financial Times. (2015). Ten Consequences of The Commodity Crash; https://www.ft.com/content/a635b463-b19f-36ef-8a81-c4c332bfe14e

Friede, G., Busch, T., & Bassen, A. (2015). ESG and Financial Performance: aggregated evidence from more than 2000 empirical studies. Journal of Sustainable Finance & Investments, *5*(4), 210-233.

Gil–Bazo, J., Ruiz–Verdú, P., & Santos, A. A. P. (2010). The performance of socially responsible mutual funds: The role of fees and management companies. *Journal of Business Ethics, 94,* 243–263.

Glode, V., (2011). Why Mutual Fund 'Underperform'. *Journal of Financial Economics, 99*(3), 546-559.

Gregory, A., Matatko, J. and Luther, R. (1997) Ethical Unit Trust Financial Performance: Small Company Effects and Fund Size Effects, *Journal of Business Finance and Accounting, 24*(5), 705-725.

Holland, J. (1998). Influence and intervention by financial institutions in their investee companies. *Corporate Governance, 6*.

Henke, H., (2016). The effect of social screening on bond mutual fund performance. *Journal of Banking & Finance*, *67*, 69 – 84.

Kacperczyk, M. T., Van Nieuwerburgh, S. V., & Veldkamp, L. (2014). Time-varying fund manager skill. *Journal of Finance, 69*(4), 1455–1484.

Kemp M. 2001. Corporate Social Responsibility in Indonesia: Quixotic Dream or Confident Expectation? *Technology, Business and Society Programme Paper*, Number 6, United Nations Research Institute for Social Development.

Kosowski, R. (2011). Do mutual funds perform when it matters most to investors? US mutual fund performance and risk in recessions and expansions. *Quarterly Journal of Finance, 1*, 607–664.

Kreander, N., Gray, R. H., Power, D. M., & Sinclair, C. D. (2005). Evaluating the performance of ethical and non-ethical funds: A matched pair analysis. *Journal of Business Finance & Accounting*, *32*(7/8), 1465–1493.

Kreibohm, E. M. (2016). *The Performance of Socially Responsible Investment Funds in Europe: An Empirical Analysis*. Cologne: Josef Eul Verlag GmbH.

Lee, D. D., Humphrey, J. E., Benson, K. L., & Ahn, J. Y. (2010). Socially responsible investment performance: The impact of screening intensity. Accounting & Finance, *50*(2), 351-370.

Leite, P., & Cortez, M. C. (2015). Performance of European socially responsible funds during market crises: Evidence from France. *International Review of Financial Analysis*, *40*,132–141.

Limkriangkrai, M., Koh, S., & Durand, R. B. (2017). Environtmental, social, and governance (ESG) profiles, stock returns, and financial policy: Australian evidence. *International Review of Finance, 17*, 461 – 471.

Mallin, C., Saadouni, B., & Briston, R. (1995). The Financial Performance of Ethical Investment Funds. Journal of Business Finance & Accounting, *22*(4), 483-496.

Matten, D., & Moon, J. (2008). "Implicit" and "Explicit" CSR: A Conceptual Framework for a Comparative Understanding of Corporate Social Responsibility. *The Academy of Management Review*, *33*(2), 404-424.

Muñoz, F., Vicente, R., & Ferruz, L. (2015). Stock-picking and style-timing abilities: A comparative analysis of conventional and socially responsible mutual funds in the US market. *Quantitative Finance*, *15*(2), 345–358.

McGuire, J., Sundgren, A., & Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. *Academy of Management Journal*, *31*(4), 854–872.

Nakai, M., Yamaguchi, K., & Takeuchi, K. (2016). Can SRI funds better resist global financial crisis? Evidence from Japan. *International Review of Financial Analysis*, *48*, 12-20.

Nofsinger, J., & Varma, A. (2014). Socially responsible funds and market crises. Journal of Banking & Finance, *48*, 180–193.

Renneboog, L., Horst, J. T., & Zhang, C. (2008). The price of ethics and stakeholder governance: The performance of socially responsible mutual funds. *Journal of Corporate Finance*, *14*, 302–322

Renneboog, L., Horst, J. T., & Zhang, C. (2011). Is ethical money financially smart? Nonfinancial attributes and money flows of socially responsible investment funds. *Journal of Financial Intermediation*, 20, 562–588.

Riedel, A., & Smeets, P. (2017). Why Do Investors Hold Socially Responsible Mutual Funds? *The Journal of Finance*, *72*(6), 2505-2550.

Schueth, S. (2003). Socially Responsible Investing in the United States. *Journal of Business Ethics*, *43*(3), 189-194.

Wang, X. (2010). On time varying mutual fund performance. *Working Paper presented at the 2010 Financial Management Association (FMA) European Conference*, Hamburg, Germany.

Ziegler, A. (2009). Is it beneficial to be included in a sustainability stock index? A panel data study for European firms [working paper 09/121]. *Center of Economic Research at ETH Zurich*.

APPENDIX A. Regression result using data from 2006 - 2016

Table A1 Portfolio performance using three different asset pricing model

This table shows estimates alpha performance from all ESG rated portfolios versus non-ESG rated matched portfolios with separate alpha for α2006 (data 2006-2016) and α2008(data 2008-2016). For every companies in our sample portfolio, we put a sample of matched conventional companies for comparison. The CAPM alpha is regressed using the CAPM model. The FF3 alpha is regressed using the Fama&French three factor model (1993), which amplifies the CAPM model with size and value factor. The Carhart 4-factor Alpha is regressed using the Fama&French three-factor model augmented by Carhart (1997). *, **, *** denotes that the independent variable is significant at the 10, 5, and 1 percent level respectively.

Portfolio	CAPM Alpha				FF3 Alpha				Carhart 4-Factor Alpha			
	Full Period		Crisis	Non-crisis	Full Period		Crisis	Non-crisis	Full Period		Crisis	Non-crisis
	α 2006	α 2008			α 2006	α 2008			α 2006	α 2008		
High-Level												
ESG	0.289	0.406	-0.248	0.671**	0.191	0.308	-0.279	0.569*	0.264	0.366	-0.390	0.561*
	-0.95	(1.29)	(-0.23)	(2.25)	-0.65	(1.00)	(-0.24)	(1.94)	-0.86	(1.16)	(-0.17)	(1.77)
Conventional	-1.042***	-1.166***	-1.074	-1.003**	-1.238***	-1.328***	-1.856	-1.066**	-1.217***	-1.327***	-2.110	-1.075**
	(-2.68)	(-2.85)	(-0.55)	(-2.40)	(-3.25)	(-3.17)	(-0.85)	(-2.55)	(-2.91)	(-2.93)	(-0.68)	(-2.12)
Diff	1.331	1.572	0.826	1.674	1.429	1.636	1.577	1.635	1.481	1.693	1.720	1.636
Low-Level												
ESG	-0.307	-0.504	-1.274	-0.170	-0.386	-0.532*	-1.338	-0.262	-0.384	-0.508	0.633	-0.208
	(-0.96)	(-1.58)	(-0.87)	(-0.81)	(-1.32)	(-1.84)	(-0.93)	(-1.25)	(-1.25)	(-1.65)	(0.39)	(-0.94)
Conventional	-0.946*	-1.010*	-5.250	0.111	-0.972*	-1.002*	-4.842	-0.029	-1.029*	-1.059*	-0.318	0.060
	(-1.67)	(-1.69)	(-1.29)	(0.37)	(-1.89)	(-1.86)	(-1.22)	(-0.10)	(-1.91)	(-1.83)	(-0.15)	(0.19)
Diff	0.639	0.506	3.976	-0.281	0.586	0.470	3.504	-0.233	0.645	0.551	0.951	-0.268
Sensitive Sec												
ESG	-0.61	-0.600	-1.598	-0.291	-0.699*	-0.625	-1.120	-0.486	-0.673*	-0.613	1.829	-0.387
	(-1.55)	(-1.50)	(-0.79)	(-0.87)	(-1.84)	(-1.63)	(-0.54)	(-1.39)	(-1.67)	(-1.48)	(0.98)	(-0.98)
Conventional	-0.497	-0.670	-2.295	-0.406	-0.535	-0.645	-1.681	-0.605	-0.515	-0.606	3.251	-0.100
	(-1.19)	(-1.50)	(-1.03)	(-0.94)	(-1.35)	(-1.47)	(-0.71)	(-1.44)	(-1.22)	(-1.31)	(1.29)	(-0.22)
Diff	-0.113	0.070	0.697	0.115	-0.164	0.020	0.561	0.119	-0.158	-0.007	-1.422	-0.287
Environment												
ESG	-	-0.159	-1.749	0.194	-	-0.229	-1.823	0.015	-	-0.233	-0.290	0.074
	-	(-0.48)	(-1.01)	(0.74)	-	(-0.70)	(-0.86)	(0.06)	-	(-0.65)	(-0.21)	(0.25)
Conventional	-	0.159	-0.784	0.366	-	0.113	-0.056	0.149	-	0.129	0.060	0.192
	-	(0.45)	(-0.67)	(0.95)	-	(0.32)	(-0.06)	(0.38)	-	(0.35)	(0.09)	(0.48)
Diff		-0.318	-0.965	-0.172		-0.342	-1.767	-0.134		-0.362	-0.350	-0.118
Social												
ESG	-0.153	-0.188	0.566	-0.090	-0.252	-0.247	0.105	-0.158	-0.196	-0.205	0.368	-0.195
	(-0.45)	(-0.69)	-0.50	(-0.41)	(-0.81)	(-0.96)	(0.11)	(-0.72)	(-0.64)	(-0.76)	(0.23)	(-0.84)
Conventional	-0.397	-0.692*	-1.632	-0.429	-0.504	-0.823**	-2.020	-0.513	-0.479	-0.770**	-4.253**	-0.349
	(-1.01)	(-1.78)	(-1.04)	(-1.03)	(-1.29)	(-2.13)	(-1.28)	(-1.22)	(-1.22)	(-1.99)	(-2.62)	(-0.84)
Diff	0.539	0.504	2.198	0.339	0.252	0.576	2.125	0.355	0.283	0.565	4.621	0.154
Total												
ESG	-0.162	-0.198	0.566	-0.105	-0.267	-0.262	0.105	-0.183	-0.214	-0.224	0.368	-0.222
	(-0.48)	(-0.72)	(0.50)	(-0.47)	(-0.86)	(-1.03)	(0.11)	(-0.82)	(-0.70)	(-0.83)	(0.23)	(-0.93)
Conventional	-0.025	-0.582	-0.408	-0.408	-0.012	-0.529	-0.361	-0.347	0.067	-0.455	-1.130	-0.219
	(-0.05)	(-1.36)	(-0.26)	(-0.87)	(-0.03)	(-1.22)	(-0.24)	(-0.74)	-0.14	(-1.04)	(-0.47)	(-0.44)
Diff	-0.137	0.384	0.974	0.303	-0.255	0.267	0.466	0.164	-0.281	0.231	1.498	-0.003

Table A2 Factor loading for Fama&French four factor model

This table depicts the coefficients estimates from Fama&French three factor model (1993), augmented by Carhart (1997) with different data sample. The 2006 denote for data from 2006 – 2016 and the 2008 denotes for data from 2008 - 2016. MKT represent the excess market return, SML represent size factor, HML represent value factor and WML represent momentum factor. *, **, *** denotes that the independent variable is significant at the 10, 5, and 1 percent level respectively.

Portfolio	Alpha		MKT		SMB		HML		WML		Adj R-sq	
	2006	2008	2006	2008	2006	2008	2006	2008	2006	2008	2006	2008
High Level												
ESG	0.264	0.366	0.742***	0.736***	0.098	0.063	0.225**	0.229*	-0.077	-0.077	0.671	0.707
Conventional	-1.217***	-1.327***	0.651***	0.653***	0.200	0.134	0.484***	0.415**	-0.022	-0.001	0.473	0.511
Low Level												
ESG	-0.384	-0.508	0.853***	0.833***	0.312**	0.294*	0.255***	0.164*	-0.002	-0.032	0.762	0.785
Conventional	-1.029*	-1.059*	0.710***	0.722***	0.427*	0.401	0.180	0.147	0.060	0.077	0.445	0.435
Sensitive_Sec												
ESG	-0.673*	-0.613	0.929***	0.932***	0.289*	0.279	0.264*	0.157	-0.028	-0.015	0.693	0.730
Conventional	-0.515	-0.606	0.791***	0.787***	0.380*	0.294	0.175	0.041	-0.021	-0.052	0.583	0.596
Environment												
ESG	-	-0.233	-	0.648***	-	0.265	-	0.258	-	0.006	-	0.646
Conventional	-	0.129	-	0.572***	-	0.066	-	0.123	-	-0.022	-	0.516
Social												
ESG	-0.196	-0.205	0.729***	0.735***	0.267**	0.218*	0.275**	0.202*	-0.059	-0.055	0.624	0.779
Conventional	-0.479	-0.770**	0.498***	0.706***	-0.086	0.010	0.197	0.271*	-0.064	-0.069	0.397	0.580
Total												
ESG	-0.214	-0.224	0.735***	0.741***	0.264**	0.215*	0.287**	0.216**	-0.056	-0.052	0.627	0.782
Conventional	0.067	-0.455	0.578***	0.586***	0.472***	0.278**	0.068	-0.037	-0.083	-0.100	0.393	0.477