UNIVERSITEIT TWENTE.

ESG issues in the palm oil investments

An event study on the listed palm oil companies in Singapore, Indonesia, and Malaysia

Master Thesis

January 26, 2016

Author:	Nanda Erian
Student number:	s1482289
Programme:	Financial Engineering and Management MSc

Supervisory committee:

Internal supervisors:	Ir. drs. A.C.M. de Bakker
	Dr. B. Roorda

Preface

This Master Thesis is written during my internship in Profundo, an economic and financial research consultancy analyzing commodity chains, financial institutions, and CSR issues. One of the main focuses of Profundo is analyzing how financial institutions can effectively disguise investments that are harmful for the humans and environment, and also what financial institutions currently do to create sustainable economic development. During the internship, I was involved in the financial research on the sustainability of the palm oil industry, which mainly focused in Singapore, Indonesia, and Malaysia. As an Indonesian, I was lucky enough to find a project in the Netherlands analyzing my own home country, which aims for the environmental sustainability, social justice, and better governance in the palm oil activities, including in Indonesia. It has been an inspiring work experience, knowing that the financial knowledge I obtained during my Master Degree can be contribute to a more sustainable world.

I would like to thank Profundo team, especially Jan Willem van Gelder and Retno Kusumaningtyas, for the internship experiences, and surely for the support to this Master Thesis. I gained a lot of useful inputs for this Master Thesis, either data or advices. I hope that this Master Thesis could give additional insights for the analysis regarding investments in the palm oil industry.

Furthermore, I would like to thank Mr. de Bakker as my first supervisor, whom have guided me throughout this Master Thesis development. I am especially grateful to Mr. de Bakker for advising me to use event study framework and giving guidance so that I can achieve my target for the completion of this Master Thesis. I also would like to thank Mr. Roorda as my second supervisor, for the advices during my search for the thesis topic and for the inputs to this Master Thesis.

In this opportunity, I also would like to thank the Indonesia Endowment Fund for Education (LPDP) for giving me the scholarship to pursue this Master degree. Lastly, I would like to thank my friends and families for the supports during my study in Universiteit Twente.

Amsterdam, 26th January 2016.

Abstract

We present the analysis of the impact of the Environmental, Social, and Governance (ESG) issues on the stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia using the event study framework. The center of an event study is the measurement of an abnormal stock return, which is the actual ex-post return of the security over the event window minus the normal return of the firm over the event window (MacKinlay, 1997). In this research, the chosen model to calculate the normal return on the initial assessment is the market model, while the constant mean return model is used as the reliability test. The main events analyzed in this research are divided into three main groups, which are the haze crisis in 2015, the ESG issues reports, and the ESG commitment reports. Eventually, the statistical conclusion of our assessment on the haze crisis in 2015 shows a significant negative impact to the stock return, which is also in line with the reported news regarding the events. For the ESG issues reports, we also have the evidence of the negative impact, but it is relatively low and on the significance level of 10%. Then, we do not have evidence to show the impact of the ESG commitment reports. The lack of samples is proven to result problems in the validity of the model as for the groups that have relatively low number of samples, the normality assumption is violated. In terms of reliability, our initial assessment model is proven to be robust as it leads to the same statistical conclusion in the sensitivity analysis on the changes of event window and estimation window length. Also, the market model and the constant mean return model result consistent inferences in this research, though with significant difference of cumulative average abnormal returns (CAAR) in some of the results.

Keywords: ESG, palm oil, event study, market model, abnormal return, stock return.

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1 Introduction

In the first chapter of this thesis, we present the background and approach to achieve the objective of the research. We start with the introduction to the problem and how the current situation leads us to raise the research questions. Then we continue with the description of the scope, questions, and methodology of the research. We end this chapter by giving the outline of this thesis.

1.1 Core problem and its background

Mielke (as cited in WWF, FMO, & CDC, 2012) presented that the Palm oil demand has been predicted to accelerate more than 65% growth by 2020 over 2010 baselines, due to the rapidly expanding populations, changing consumption patterns, and increasing demand from the Bioenergy and Oleochemicals industries. Palm oil production has important economic impacts for Malaysia and Indonesia, where it contributed 3.2% of the Malaysian GDP and 6% to 7% of the Indonesian GDP, presented in RSPO report in 2011 (as cited in WWF et al., 2012). Investing in the palm oil industry, however, is not guaranteed to be a success. There is set of challenges faced by the industry, including land and labor shortages, environmental destruction, social conflicts, irregular weather patterns, rising costs for fuel and fertilizer, litigation risk in producer and consumer markets, and pressure for transparency and sustainability for consumer and corporate buyer (WWF et al., 2012).

The haze crisis that affected Indonesia from approximately June 2015 has been an example of how an environmental issue creates a risk to the economic growth in the palm oil industry. As has been widely reported, the industry operation is one of the roots of the forest and peatland fires which causing health problems and deaths, threatening endangered wildlife, and producing huge carbon pollution. The Indonesian government has estimated that the fires costs over $30 billion, then responding by taken public accountability measures by investigating firms and arresting executives in connection with fires. It poses serious reputational risks for the firms involved and found to be violating sustainability policies. In October 2015, the fires have already impacted the Agriculture stocks in the Jakarta Composite Index which fell 29%, ranking among the three worst performing sectoral indices in 2015 (Cushing, 2015).

As a respond to the haze crisis, The Association of Banks in Singapore (ABS) launched a new industry guideline, which aims to integrate Environmental, Social, and Governance (ESG) criteria into the risk assessment and lending decision-making process, and to improve transparency and accountability on ESG issues (Cushing, 2015). The guideline is an improvement on the sustainable finance in Singapore, Indonesia, and Malaysia, which is highlighted in a report by World Wildlife Fund (WWF) as the domestic banks and investors in the region are lagging far behind in incorporating ESG issues compared to the international financial institutions (Cushing, 2015). The report found that the leading palm oil companies listed in the region provide insufficient relevant disclosure for investors to assess the ESG issues. However, there is no evidence that domestic investors address the disclosure gaps through engagement and collaborative initiatives. Moreover, among the assessed domestic banks, only one bank appears to have the policies on financing forest-related commodity companies (WWF, 2015).

The lack of attention on ESG integration by investors and banks provokes an interest to investigate how actually the ESG issues affect the performance of the investment on the palm oil activities. We are interested to examine whether ESG issues of the palm oil companies expose a risk of loss to the

investor's investment. The research would thus give idea of the importance to incorporate the ESG issues into the decision-making process to invest on the palm oil activities.

1.2 Objective

The investment performance investigated in this research is the stock return. The objective is to provide an assessment how the ESG issues affect the stock return of the investment in the listed palm oil companies in Singapore, Indonesia, and Malaysia.

1.3 Scope

As stated in 1.1 and 1.2, this research is done in a scope of listed palm oil companies in Singapore, Indonesia, and Malaysia. Palm oil is one of the commodity sectors that exposes sustainability issues for investors, thus lessons learned about sustainability in this sector might be applicable to food, fiber, and biofuel commodities more broadly (WWF & EnviroMarket, 2012). Indonesia and Malaysia produce 87% and consume 22% of global palm oil, presented in WWF report in 2011 (WWF et al., 2012). The big palm oil companies operating in these regions are mostly listed in Singapore, Indonesia, and Malaysia, so that these countries become our scope in this research.

An event study framework is chosen as the method to investigate how the ESG issues affect the performance of the investment on the palm oil activities, where the assessed variable is the stock return. Therefore, the scope of this research is focused on the stock return to represent the financial performance.

1.4 Research questions

The expected outcome of the research is to show the impact of the ESG issues of the palm oil activities on the stock return of the companies. The intention is to give idea of the exposed risk of loss to the investor's investment due to the ESG issues. Thus the main research question is as shown below:

Is the stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia negatively affected by the ESG issues in their activities?

To answer the main research question, the following sub research questions are defined:

1. What are the ESG issues?
2. How can we determine if the activities of the palm oil companies creating an ESG issue?

The first and second sub research questions are meant to give clear definition of the ESG issues in the palm oil activities, thus the collection of the cases to be assessed can be done properly. The next sub research questions aim to give insights how the assessment to answer the main research question should be done:

3. How can we define the period and time length of the events of the ESG issues?
4. How can we measure the difference between the stock returns in the time of the events and outside the events?
5. How can we test the significance of the difference?

1.5 Methodology

The methodology of the research has been developed sequentially as shown below:

1. Literature review

The literature review in this research consists of two parts. The first part is conducted to answer the first and second sub research questions. This part aims to give clear understanding of the ESG issues definition in the palm oil activities, to become a guideline in collecting the cases that will be observed. The second part of the literature review is about the insights to build a proper method for the assessment. The insights from the literature review are also used to develop the hypotheses in this research.

2. Assessment Model development

We conducted the assessment to answer the main research question using an event study framework. An event study is a statistical method to measure the impact of a specific event on the value of a firm, thus it is a suitable framework for this research (MacKinlay, 1997). In the second step of this research, a proper event study model to conduct the assessment is developed.

3. Data collection

We collected cases of the ESG issues of the listed palm oil companies in Singapore, Indonesia, and Malaysia as the observed events. After collecting the set of cases, we gathered the corresponding financial market data that are needed in the assessment model.

4. Data assessment

After the data collection, we conducted the data assessment using the developed model. In general, the event study consists of defining and identifying the period of the events, determining the sample characteristics, and conducting statistic calculations to measure the difference of the returns impacted by the events (MacKinlay, 1997). The data assessment in this research is conducted using Microsoft Excel.

5. Result analysis

The last step of the research is to analyze the result of the assessment. The conclusion of this research is formulated to answer the main research question based on the analysis.

1.6 Outline

The outline of this thesis will be in line with the sequence of the developed methodology. The next chapter is the literature review where we explain all theories used in this thesis. In chapter 2, most of the sub research questions are answered. Then we define the event and develop the hypotheses in chapter 3, based on the insights from the literature review. The assessment model development is explained in Chapter 4, where the detailed steps to assess the impact of the ESG issues on the stock return in the observed samples will be explained thoroughly. Then in chapter 5, we explain the data collection process, including the sources of the data. We present the assessment results and analysis in chapter 6. Lastly, we provide the conclusion of the research and the recommendation for further improvement in chapter 7.

2 Literature review

We present the literature review in this chapter to answer the sub-research questions, which aim to gain background knowledge of the ESG issues in the palm oil activities and insights for the assessment model development.

2.1 The palm oil industry

Palm oil is the most common edible oil and is used in everyday foods, cosmetics, and personal hygiene products (WWF & EnviroMarket, 2012). The palm oil is the most profitable of any edible oil since it offers the highest yield. It is also important as an economic driver for some developing nations, such as Indonesia and Malaysia (WWF & EnviroMarket, 2012).

Based on the operations type, the palm oil industry can be classified into two, which are upstream and downstream operations. Upstream companies are those involved in the production of crude palm oil and downstream companies are those involved in the refining, trading, and use of palm oil products (WWF, 2008). Figure 1 provides an overview of the palm oil production chain and classifies upstream and downstream operations.

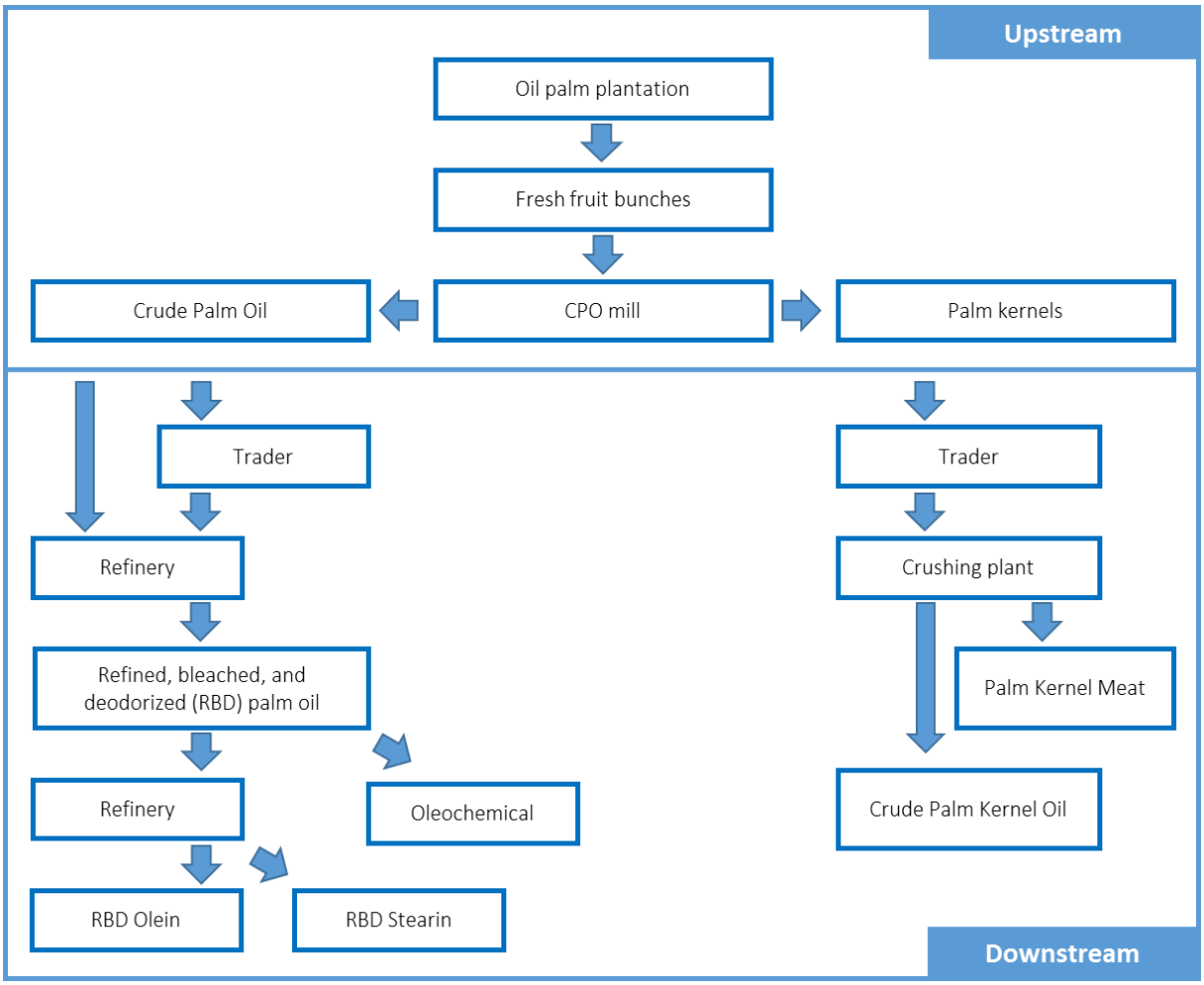

Figure 1 - Palm oil production chain (based on WWF, 2008)

During the expansion of the palm oil industry, it has been the subject of consumer, activist, and media campaigns in buyer markets, as well as frequent demonstrations and campaigns from local communities, due to its unsustainable operations. The impact on biodiversity and climate change due to deforestation, burning, and the draining of peatlands have been highlighted by the environmentalists. The industry's impacts on indigenous people, land rights, labor rights, and local communities have been focused by the social NGOs (WWF et al., 2012).

The Roundtable on Sustainable Palm Oil (RSPO) was founded in 2004 as a response to these pressures. RSPO consists of palm oil producers, civil society, governments, and buyers. It is a certification to the palm oil companies which involves undertaking a review of existing production operations, identifying areas of non-compliance with the standards, implementing an action plan to address those areas, and finally undergoing audits by an approved certification body (WWF et al., 2012). One of the applications of the RSPO certification is for financial institutions to assess a palm oil company's performance on sustainability issues, as a consideration to become the financier of the company (WWF, 2008).

2.2 Environmental, Social, and Governance (ESG) issues in the palm oil industry

In this section, we review the ESG definition, including the list of palm oil operations that can be categorized as the ESG issues. Then we take up some examples of the ESG risk analysis for the palm oil companies. We examine some studies that present the integration of the ESG criteria into financial risk management at the end of this section.

2.2.1 ESG definition

In June 2004, UN Global Compact's "Who Cares Wins" initiative proposed for the first time the concept and term of ESG to drive the attention of the mainstream investors and analysts into the criteria and influence of the environmental, social, and governance issues (WWF, 2014). In a report published on 2014 about ESG integration for banks, WWF defined the ESG by listing the issues that can be covered by the term, which are (WWF, 2014):

- Environmental: Greenhouse gas emissions, biodiversity loss, pollution and contamination, carbon regulation exposure, renewable energy;
- Social: Labor practices, community displacement, human rights, health and safety, financial inclusion;
- Governance: Corruption and bribery, reputation, management effectiveness.

In another report published in 2012, WWF listed issues that can be covered by the ESG term, but more specifically associated with the palm oil operations (WWF & EnviroMarket, 2012). The list is presented in the Table 1.

In general, we also found that the term ESG is interchangeably with the term of sustainability, for example, in a report by WWF discussed the sustainability finance in Singapore, Indonesia, and Malaysia (WWF, 2015). It is necessary to note that the list above does not limit the issues that can be covered under the ESG term. The United Nations-supported Principles for Responsible Investment (PRI) association, a partner of UN Global Impact, argued that a definitive list of ESG issues does not exist, since any list that claims to be exhaustive or definitive would inevitably be incomplete and would soon

be out of date (PRI Association, 2013). Nonetheless, for guidance purposes, PRI association also provides an explanation for ESG term, which is also relevant with the list of issues in Table 1, as shown below (PRI Association, 2013):

- Environmental: Issues relating to the quality and functioning of the natural environment and natural systems;
- Social: Issues relating to the rights, well-being, and interests of people and communities;
- Governance: Issues relating to the governance of companies and other investee entities.

This research uses the list in Table 1 as a guidance to collect the ESG issues to be assessed. The ESG issues in Singapore, Indonesia, and Malaysia are mostly reported in NGO's research, thus it is relevant to take the ESG definition from one of the leading NGO's perspective.

Environmental	Social	Governance
Deforestation and use of fire for clearing	Displacement of indigenous people	Lack of disclosure on ESG matters
Drainage of peat lands	Human/labor rights abuses	Ownership disputes
Methane emissions associated with mill effluent treatment	Poor and unsafe labor conditions for workers	Illegal operations
Biodiversity impact and species loss due to forest degradation	Public backlash due to lack of disclosure of impact on communities	Destruction of natural capital base on which company depends
Soil degradation related to intensive production	Unfair treatment and price setting	
Planting on unsuitable slopes causing soil erosion	Negative feedback or protests from NGOs	
Excessive water use		
Lack of riparian buffers resulting in contamination of rivers and soil erosion		
Pollution and waste toxicity		
Excessive use of pesticides and fertilizers		

Table 1 - The list of ESG issues associated with palm oil operations (based on WWF & EnviroMarket, 2012)

2.2.2 ESG risk analysis for the palm oil companies

Chain Reaction Research published a report in June 2015 analyzing the risk that exposes Indonesian palm oil growers due to the non-compliance to the sustainability purchasing policies (Chain Reaction Research, 2015b). The research analyzes ten largest palm oil growers listed in Indonesian stock exchange (IDX) and concludes that six out of ten palm oil companies have high-risk exposure to the No Deforestation, No Peat, No Exploitation (NDPE) purchasing policies. The high-risk is due to the growing evidence that major palm oil buyers are prepared to diminish, suspend, or cancel a trade with the palm oil growers that are suspected or proven to be non-compliance to the policies, thus these six palm oil companies have high possibility to lose buyers. The research assessed the companies by looking at their

commitment regarding to NDPE policies, which include climate change, biodiversity, and social issues (Chain Reaction Research, 2015b).

Another report published by Chain Reaction Research presents a full risk analysis, specifically on one of the palm oil companies in Indonesia, Sawit Sumbermas Sarana (SSMS) (Chain Reaction Research, 2015a). The research conducts an assessment with regard to SSMS's sustainability policy and its practices on the ground, with focus on deforestation, peatlands, biodiversity, and Free, Prior and Informed Consent (FPIC). The assessment concludes that SSMS was exposed to the risk of a potential loss of their main customers and a compensation cost due to acquiring and reforesting land. The loss of the main customers could result in more than double digit declines in Asset Turnover, ROA, and ROE for SSMS. The compensation costs could result in a decrease of the profitability due to the increased expenses. In addition, another significant risk that could expose the company is the damage of SSMS reputation among customers, investors, and public. The reputation damage could trigger further consequences of financial health of the company, such as loss for other major customers, or rejection on financing and investments from the banks and investors (Chain Reaction Research, 2015a). The reports published by Chain Reaction Research are the examples of how the ESG issues could expose a financial risk to the palm oil companies.

The case of Greenpeace's campaign against Sinar Mas in 2010 is an example of how a palm oil company lost their major customer due to reputation damage. In March 2010, Greenpeace published a report exposing how Nestle is sourcing palm oil from Sinar Mas who continues to expand into the rainforest and carbon-rich peatlands, as well as into critical orang-utans habitat (Greenpeace, 2010a). The report exposes the evidence of how Sinar Mas driving orang-utans to extinction, threatening livelihoods, destroying peatland forests, burning rainforests, and breaking the law. At the end of the report, Greenpeace demands that Nestle must immediately stop the trade with the Sinar Mas group (Greenpeace, 2010a). The campaign was launched with a viral ad campaign, social media campaign, and traditional on-the-ground activism. The campaign triggered a large amount of commentaries on blogs, which accounted for 70% of the conversations about palm oil on the web during the six-month period to September 27. Eventually, Nestle responded by changing policy and severing contracts with Sinar Mas (Harrild, 2010).

A different approach was taken in a report by WWF that not only analyze the risks of ESG issues, but also focus on the benefits of adapting an ESG policy into the palm oil operations, in this case the principles and criteria of the RSPO (WWF et al., 2012). The report presents benefits of implementing RSPO principles and criteria in the areas of operations, community relations, staff and labor, revenues and market access, and access to capital (WWF et al., 2012). These benefits then also can be the guidance to analyze the ESG risks in a palm oil company as the opportunities that can be lost if the company does not adopt the RSPO principles and criteria.

The ESG risks are defined into different categories in another report by WWF, which aims as a guidance for the investors in the palm oil industry. Table 2 presents list of risks caused by ESG issues that can disrupt the growth of the commercial value of the palm oil business and result in negative impact upon the shareholder value and investment returns (WWF & EnviroMarket, 2012).

The research in this thesis aims to provide an assessment how the ESG issues affect the stock return of the investment in the listed palm oil companies. Therefore, among the risks presented in Table 2, the focus of this research is on the reputational risks, which have higher possibilities to impact directly to the market reaction on the stock of the palm oil company.

Risks	How risks can erode shareholder value
Compliance risks	Fines and/or suspension due to violation of regulation
Social risks	Industrial stoppages and operating losses due to conflict with local communities
	Loss of social license to operate due to pressure from NGOs
Market risks	Loss of market who demand for sustainable palm oil grows
	Reduction in access to capital as lenders reluctant to finance operations
	Reduced international opportunities due to fewer trading partners
	Collapse in market access due to import/export embargo
	Pressure on share prices due to divestment by risk capital investors
Reputational risks	Reputations damage due to unsustainable practices
	Indirect reputational risks to trading partners
	Boycott and reduced sales due to consumer backlash
	Erode brand value due to increased media pressure
Productivity risks	Reduce future yields and returns due to soil erosion, water contamination, and failure to maintain site fertility
	Reduce margins due to the high cost of planting on peat lands
	Increase costs and pollution risks from use of pesticides due to the failure to maintain biodiversity
	Reduce future yields due to loss of natural habitat which leads the localized climate differences
	Lower productivity due to suboptimal timing for planting of nursery palms

Table 2 – How ESG risks can erode shareholder value (based on WWF & EnviroMarket, 2012)

2.2.3 ESG integration in risk management

We discuss studies about integrating ESG criteria into risk management to present additional insights on how the ESG criteria affect the company's performance. Duuren, Plantinga, & Scholtens (2015) investigated how conventional asset managers account for ESG factors in their investment process. They surveyed the opinions of fund managers with respect to ESG integration using an online questionnaire which was filled by 126 funds in US and Europe. The study finds that many conventional managers have adopted features of ESG factors in their investment process. It also finds that the ESG information in particular is being used for red flagging and managing risk. One of the findings closely related with this thesis is that the majority of investors who actively integrate ESG factors in their investment process sold or reduced their position in a stock because of poor ESG concerns (Duuren et al., 2015). Therefore, it is expected that the stock price of the investee is decreasing due to the investor's respond to the ESG issues.

Weber, Scholz, & Michalik (2008) analyzed whether it was possible to predict credit risks using ESG criteria and whether a combination of traditional and ESG criteria would improve the prediction of non-

default and default loans. In their study, they concentrated on the counterparty credit risks, which are mainly influenced by the reputation of the debtor, the ability to repay, the future earnings, the debtor's capital and its ratio to debt, and the value of the collateral. Thompson (1998) and Coulson and Dixon (1995) (as cited in Weber et al., 2008) stated that ESG risks could significantly influence these factors of the counterparty credit risks. The result of the analysis is that ESG criteria can be used to predict the financial performance of a debtor and improve the predictive validity of the credit rating process, which shows correlations between a firm's financial performance and its ESG performance.

Coulson (2007), Thompson (1998), and Wagner (2007) (as cited in Weber et al., 2008) support the finding by presenting that the integration of ESG risks into the rating process resulted in improved risk prediction and risk management for lenders, because ESG risks influence the risk of the loans. Scholz et al. (as cited in Weber et al., 2008) have also reported that some of the environmentally caused credit defaults could have been prevented if the lenders had used a rating system that consisted not only of economic and financial indicators, but also of ESG indicators.

WWF (2008) published a guideline to help financial institutions to reduce the environmental and social risks associated with transactions in the palm oil industry. The guideline has received advantages from the input of representatives of several financial institutions including ABN AMRO Bank, Fortis, HSBC, the International Finance Corporation, ING Bank, Rabobank, and Standard Chartered, and from CIS Cooperative Insurance as an institutional investor. One of the guidelines presented in the report is the model screening process describing a process for screening clients seeking credit, for compliance with the model palm oil policy. The model screening process consists of several steps as shown below (WWF, 2008):

- Step 1
  Bank informs the company about the bank's palm oil policy, decides whether to invoke the screening process, and requests the company to start the process by completing a questionnaire.

- Step 2
  For established upstream operations, Bank reviews all production units and classifies each unit as:
  a) RSPO-certified;
  b) In-progress to compliance with RSPO criteria;
  c) Not RSPO-certified and not progressing; or
  d) Not yet assessed for compliance with RSPO criteria

  For new or expanded upstream operations:
  Bank reviews the plans for these mills or plantations

  For downstream operations:
  Bank reviews the palm oil procurement policies and practices of these operations

- Step 3
  Bank sets conditions of engagement with the company, as appropriate, to ensure:

a) Compliance with RSPO criteria across all upstream production units;
b) Compliance with RSPO criteria is built into the planning processes for new production units, and/or
c) The company progressively increases the proportion of RSPO-certified palm oil entering its supply chains

- Step 4
  Bank and company schedule the steps to be taken to satisfy the preconditions and complete the screening process. If the company accepts conditions and timetable, then the process can continue.

- Step 5
  Pre-financing actions implemented. If the company satisfies pre-finance conditions, then the process can continue.

- Step 6
  Bank approves financing, finalizes sustainability covenants and works with company to schedule company actions to meet the covenants and bank actions to monitor compliance.

- Step 7
  Bank monitors the company's compliance with sustainability covenants.

This guideline could give insights of the current practice of integrating ESG criteria into risk assessment policies, specifically in the palm oil industry. Moreover, this guideline also shows how each classification of the palm oil companies based on their operations and their commitment level to ESG has a different approach of assessment.

2.3 Event study framework

The assessment to answer the main research question in this research is done by using an event study framework. An event study is a statistical method to measure the impact of a specific event on the value of a firm, thus it is a suitable framework for this research (MacKinlay, 1997). In general, the event study consists of defining and identifying the period of the events, determining the sample characteristics, and conducting statistic calculations to measure the difference of the returns impacted by the events (MacKinlay, 1997). The usefulness of the event study is based on the fact that, given rationality in the marketplace, the effects of an event will be reflected without delay in security prices. Most of the application of the event study is the effect of an event on the price of a particular class of securities of the firm, most often common equity (MacKinlay, 1997).

The timeline in an event study consists of estimation window, event window, and post-event window. The event window is the period over which the security prices of the firms involved in the event will be examined. The center of an event study is the measurement of an abnormal stock return, which is the actual ex-post return of the security over the event window minus the normal return of the firm over the event window (MacKinlay, 1997). The normal return itself defined as the expected return without conditioning on the event taking place. The normal return is calculated based on the return in the

estimation window, the period prior to the event (MacKinlay, 1997). Figure 2 shows the timeline for an event study, with each **T** represents the time, and **t** is the event date.

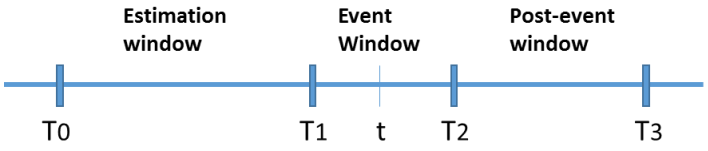

Figure 2 - Timeline for an event study (MacKinlay, 1997)

The normal return can be calculated using several approaches, which can be grouped into statistical and economic approaches. Models in the statistical approach are solely based on statistical assumptions concerning the behavior of stock returns and do not depend on any economic arguments. The most common models for statistical approaches are constant mean return model and market model. On the other hand, models in the economic approach rely on both statistical assumptions and economic arguments concerning investors' behaviors, such as the risk free rate, market risk premium, and estimated beta. For economic approaches, two common models are the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) (MacKinlay, 1997).

The market model is the chosen approach in this research. To calculate the normal return, the market model relates the return of any given security to the return of the market portfolio using regression analysis. Compared to CAPM and APT, the normal return in market model is calculated solely based on the regression analysis, while CAPM and APT also rely on economic restrictions. In CAPM, the normal return relies on the risk free rate, market risk premium, and estimated beta. Then in APT, the normal return relies on the macroeconomic factors, risk free rate, and estimated beta. It is discovered that the market model can avoid the potential for sensitivity to the economic restrictions in CAPM, thus the use of the CAPM has almost ceased. APT might add explanatory power compared to CAPM, but the gains from using it versus the market model are small. Therefore, the market model is more often to use compared to these two economic models (MacKinlay, 1997).

The normal return calculated in the constant mean return model is simply the mean of the return in the estimation window. The market model can improve the constant mean return model by removing the portion of the return that is related to variation in the market's return, thus the variance of the abnormal return is reduced (MacKinlay, 1997). This can increase the ability to detect event effects. The benefit from using the market model depends on the R^2 of the regression, where the higher R^2 the greater is the variance reduction of the abnormal return (MacKinlay, 1997). Nonetheless, the constant mean return model is also used in this research as a reliability test to the result of the assessment using the market model. Though the constant mean return model is considered as the simplest model, Brown and Warner (as cited in MacKinlay, 1997) find it often yields results similar to those of more sophisticated models.

3 Event definition and hypotheses development

The event in this assessment model refers to the ESG issues incident in the palm oil company's activities, and the event date is defined based upon the period of the news publication where the incident is reported. We created three groups of event in this research, which are the haze crisis event in 2015, the ESG issue reports in 2009 – June 2015 (bad news), and an additional research on the event when the palm oil companies published a commitment to improve their ESG performance in 2009 – June 2015 (good news). For each group of event, we further analyzed factors that could influence a different effect magnitude of the event on the stock return of the companies.

3.1 The haze crisis in 2015

One of the backgrounds of this research is the haze crisis that affected Singapore, Indonesia, and Malaysia in June 2015 until approximately the end of October 2015, and have already impacted the Agriculture stocks in the Jakarta Composite Index which fell 29% in this period, ranking among the three worst performing sectoral indices in 2015 (Cushing, 2015). Surely it is expected that if we assess the event of the haze crisis using the model we developed in this research, the result will show that the haze crisis affects the stock return of the palm oil companies negatively. Therefore, we developed our first hypothesis as shown below:

H1: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the haze crisis in 2015

Among of the benefits of implementing RSPO principles and criteria presented by WWF et al. (2012) are the market and capital access to the buyers and investors who are committed only to buy certified sustainable palm oil (CSPO). Therefore, we consider that the buyers and investors of the RSPO members mostly have a high concern about sustainability. Thus, it is expected that the RSPO members have a higher negative impact (lower abnormal return) in the time of the haze crisis. This is due to the buyers and investors who are more reactive to the ESG issues in the RSPO members. We analyzed the influence of RSPO status on the effect of the haze crisis, using the hypothesis H1a below:

H1a: The Palm oil companies that are RSPO members show lower abnormal return (more negative) compared to non-RSPO members in the haze crisis 2015

The highlight of the bad news exposed to the palm oil companies during the haze crisis is the forest burning activities that allegedly done by the palm oil plantation companies. It is then plausible that this bad news affect more negatively to the companies involved in the upstream activities. The hypothesis H1b is meant to analyze this estimation.

H1b: The Palm oil companies involved in upstream activities show lower abnormal return (more negative) compared to the companies that only involved in downstream activities in the haze crisis 2015

WWF (2015) measures the extent to which the banks in Singapore, Indonesia, and Malaysia are considering sustainability in their financing and investment activities. The variation among countries that the research found is that Indonesian banks are typically further ahead in terms of sustainability

consideration, while Singaporean banks provided the least relevant disclosure on it. It is then also interesting to see the national variation in this research by using the finding by WWF as the base for the hypothesis. The more a country is considering sustainability, the worse the abnormal return in the palm oil companies in the haze crisis event. The hypothesis is shown below:

H1c: The palm oil companies listed in Indonesia show the worst abnormal return, while the palm oil companies listed in Singapore show the best abnormal return among the three countries in the haze crisis 2015

3.2 The ESG issue reports

As discussed in the literature review, this research uses the list in Table 1 as a guidance to collect the ESG issues to be assessed. Looking at the explanation in section 2.2.2, we expect that the result of the assessment will show that the stock return is negatively affected by the ESG issues, thus the hypothesis for this analysis is shown below:

H2: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the ESG issue reports in 2009 – June 2015

It is interesting to analyze which issue that included in ESG definition has the most influence on the stock return of the palm oil companies. From section 2.2.2, we have the insights about how the ESG issues could expose a financial risk to the palm oil companies, where most of the issues discussed has a direct impact on sales of the companies, such as the loss of the main customer. Therefore, we predicted the most negative impact (lowest abnormal return) will be resulted from the ESG issues that have a direct impact on the sales, as shown in the hypothesis below:

H2a: The ESG issue reports in 2009 - June 2015 that have a direct impact on the sales of the palm oil companies in Singapore, Indonesia, and Malaysia result the lowest abnormal return among other ESG issues

The initiatives to improve the ESG performance of the palm oil companies keep progressing in each year, either it is from the NGOs campaign, the financial institution policies, or the palm oil companies commitment. Thus, it is expected that the awareness of the ESG compliance is increasing in each year, which result in higher negative impact for companies that creating an ESG issue. We then developed a hypothesis for this concern, as shown below:

H2b: The ESG issue reports published in more recent years result in more negative impact on the stock return of the palm oil companies in Singapore, Indonesia, and Malaysia

Moreover, we also analyzed the national variation for the impact of the ESG issue reports in 2009 – June 2015, as stated in the hypothesis H2c:

H2c: The palm oil companies listed in Indonesia show the worst abnormal return, while the palm oil companies listed in Singapore show the best abnormal return among the three countries in the impact of the ESG issue reports in 2009 – June 2015

3.3 The ESG commitment reports

We developed an additional research on the event when the palm oil companies published a commitment to improve their ESG performance in 2009 – June 2015. Since we have created a hypothesis that the stock return is negatively affected by the ESG issue reports, it is interesting to strengthen this hypothesis by also analyzing how the stock return is affected by the ESG commitment reports. Surely, we expect that the stock return is positively affected by these ESG commitments. The hypothesis for this analysis is shown below:

H3: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are positively affected by the ESG commitment reports in 2009 – June 2015

4 Event study model development

In this chapter, we present the development of the event study model which is suitable to do the assessment to answer our main research question. The event study model developed in this research is mainly based on MacKinlay (1997).

4.1 Assessment methodology

In this section, we present the sequence of the assessment using the event study framework, as also pictured in Figure 3.

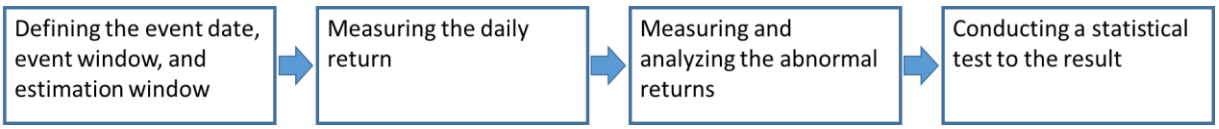

Figure 3 - Assessment methodology

1. Defining the event date, event window and estimation window.

The following task in conducting an event study after defining the event of interest is to identify the event date, event window, and estimation window. We determined the event date based on the publication date of the report of an incident. For the event window, we determined a different length for the haze crisis event and the other two groups of events, since the haze crisis relatively had much higher coverage of news compared to the events in the other two groups. To be able to examine the period surrounding the event, it is also customary to determine the event window larger than the event date (MacKinlay, 1997). Therefore, our minimum event window length is two days, including the event date. The estimation window has to be sufficient to result good estimation and to minimize sampling error. We determined 250 days prior to the event date as the estimation window in this research, which is based on the example of the event study presented by MacKinlay (1997).

2. Measuring the daily return

We used the market model as our approach to measure the normal return based on the comparison presented in 2.3. The market model relates the return of any given security to the return of the market portfolio to calculate the normal return (MacKinlay, 1997). The initial task to measure the normal return using the market model is to calculate the daily return of the market portfolio and the return of the securities. Our chosen market portfolio and securities are explained in chapter 5. The formula to calculate the daily return (**R**) of the stock price (**P**) of securities **i** in day **t** is shown in equation 3-1 (MacKinlay, 1997).

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \tag{3-1}$$

Using the equation 3-1, we calculated the daily return both for the market portfolio and the securities on all days included in the estimation window and event window.

3. Measuring and analyzing the abnormal returns

In market model, the normal return is calculated using linear regression based on the ordinary least squares (OLS) linear method, as shown in equation 3-2 (MacKinlay, 1997).

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$
$$E(\varepsilon_{it}) = 0 \; ; \; var(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2 \quad \text{(3-2)}$$

R_{it} and R_{mt} are the period-**t** returns on security **i** and the market portfolio, respectively, and $\boldsymbol{\varepsilon_{it}}$ is the zero mean disturbance term indicating the portion of the equation that is not explained by the equation. $\boldsymbol{\alpha_i}$, $\boldsymbol{\beta_i}$, and $\boldsymbol{\sigma_{\varepsilon_i}^2}$ are the parameters of the market model, where $\boldsymbol{\alpha_i}$ is the vertical intercept, $\boldsymbol{\beta_i}$ is the slope, and $\boldsymbol{\sigma_{\varepsilon_i}^2}$ is the disturbance variance (MacKinlay, 1997). We used excel functions which are INTERCEPT, SLOPE, and the square of STEYX function result, to estimate $\boldsymbol{\alpha_i}$, $\boldsymbol{\beta_i}$, and $\boldsymbol{\sigma_{\varepsilon_i}^2}$ respectively over the estimation window.

Given the $\boldsymbol{\alpha_i}$, $\boldsymbol{\beta_i}$, and $\boldsymbol{\sigma_{\varepsilon_i}^2}$, we further used the equation 3- 3 to measure the sample abnormal return in the event window ($\boldsymbol{\widehat{AR}_{it}}$) for each securities (MacKinlay, 1997).

$$\widehat{AR}_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad \text{(3-3)}$$

After calculating the sample abnormal return in the event window for each securities, we calculated the average sample abnormal returns ($\boldsymbol{AAR_t}$) of all securities (with **N** is total securities) on each day in the event window, as shown in the equation 3-4. We also calculated the variance using the formula in the equation 3-5 (MacKinlay, 1997).

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} \widehat{AR}_{it} \quad \text{(3-4)}$$

$$var(AAR_t) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{\varepsilon_i}^2 \quad \text{(3-5)}$$

Eventually, we calculated the Cumulative Average Abnormal Return (CAAR), which is the aggregation of the average abnormal returns through time and across securities, in order to draw overall inferences for the event effect (MacKinlay, 1997). Defining the event window as t_1 until t_2, we calculated the CAAR ($\boldsymbol{CAAR(t_1, t_2)}$) using the equation 3-6. Its variance was then also calculated using the equation 3-7 (MacKinlay, 1997). The numbers resulted from equation 3-6 and 3-7 are the one that we analysed as the effect of the events to the stock prices of the securities.

Event study model development

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t \quad (3\text{-}6)$$

$$var\big(CAAR(t_1, t_2)\big) = \sum_{t=t_1}^{t_2} var(AAR_t) \quad (3\text{-}7)$$

4. Conducting a statistical test to the result

The null hypothesis in conducting event study framework (H0a) is that the event has no impact on the behavior of returns (mean or variance) (MacKinlay, 1997). Therefore, looking at the hypotheses developed in this research, we expect to reject this H0a. Under the H0a, the distribution of $CAAR(\boldsymbol{t_1}, \boldsymbol{t_2})$ is asymptotically normal with zero mean and unit variance as shown in equation 3-8.

$$CAAR(t_1, t_2) \sim N[0, var\big(CAAR(t_1, t_2)\big)] \quad (3\text{-}8)$$

The assumptions of the $CAAR(\boldsymbol{t_1}, \boldsymbol{t_2})$ distribution are multivariate normal, independent, and identically distributed. The central limit theorem guarantees that if the abnormal returns in the securities are independent and identically distributed, the distribution of $\boldsymbol{AAR_t}$ converges to normality as the number of samples of securities increases (Brown & Warner, 1985). Therefore, $CAAR(\boldsymbol{t_1}, \boldsymbol{t_2})$, as the cumulative of $\boldsymbol{AAR_t}$, also has asymptotically normal distribution. Nevertheless, the normality of $\boldsymbol{AAR_t}$ will still be tested to validate the model.

Next, we tested the H0a using the distributional properties of $CAAR(\boldsymbol{t_1}, \boldsymbol{t_2})$ which is shown in the equation 3-9.

$$\theta_1 = \frac{CAAR(t_1, t_2)}{var\big(CAAR(t_1, t_2)\big)^{\frac{1}{2}}} \sim N(0,1) \quad (3\text{-}9)$$

The last step of the statistical test is calculating the significance level of $\boldsymbol{\theta_1}$, which is expressed as the P-value. The P-value is the probability of getting a value as extreme as or more extreme than what was actually observed, given that H0a is true (Larsen & Marx, 2012). We applied a one tailed t-test to the $\boldsymbol{\theta_1}$, with degree of freedom as N – 1, using an Excel TDIST function. If the P-value calculated is less than or equal to $\boldsymbol{\alpha}$, the H0a can be rejected at the $\boldsymbol{\alpha}$ level of significance (Larsen & Marx, 2012). We compared the result of the test using significance level of $\boldsymbol{\alpha} = 10\%$, $\boldsymbol{\alpha} = 5\%$ and $\boldsymbol{\alpha} = 1\%$.

5. Comparing the CAAR between two clusters

An additional statistical test was done after we conducted the assessment to find the CAAR for each clusters defined in the hypotheses. We compared the CAAR between two clusters to measure whether the CAAR difference between two clusters is really significance. We used Welch's approximation (also known as the unequal variance t-test) to do the comparison. The null hypothesis for this statistical test

(H0b) is the CAAR between two clusters are equal, thus we expected to reject the H0b to support our hypotheses (Larsen & Marx, 2012).

Defining $CAAR_X$ and $CAAR_Y$ as the CAAR of two clusters that were tested, we calculated the random variable W of the difference of the two clusters using equation 3-10 (Larsen & Marx, 2012).

$$W = \frac{CAAR_X - CAAR_Y}{\sqrt{\frac{var(CAAR_X)}{n} + \frac{var(CAAR_Y)}{m}}} \tag{3-10}$$

We defined n and m as the sample size, then $var(CAAR_X)$ and $var(CAAR_Y)$ as the variances of $CAAR_X$ and $CAAR_Y$ respectively. In Welch's approximation, W is approximately distributed as a Student t random variable (Larsen & Marx, 2012). The degrees of freedom of the student t distribution (v) is calculated using the equation 3-11 (Larsen & Marx, 2012).

$$v = \frac{(\frac{var(CAAR_X)}{var(CAAR_Y)} + \frac{n}{m})^2}{\frac{1}{(n-1)}(\frac{var(CAAR_X)}{var(CAAR_Y)})^2 + \frac{1}{(m-1)}(\frac{n}{m})^2} \tag{3-11}$$

Similar with our previous statistical test, the significance level is expressed as the P-value. We applied a one tailed t-test to the W, with degree of freedom of v (rounded down to the nearest integer), using an Excel function of TDIST. If the P-value calculated is less than or equal to $\boldsymbol{\alpha}$, the H0b can be rejected at the $\boldsymbol{\alpha}$ level of significance (Larsen & Marx, 2012). We also compared the result of the test using significance level of $\boldsymbol{\alpha} = 10\%$, $\boldsymbol{\alpha} = 5\%$ and $\boldsymbol{\alpha} = 1\%$.

4.2 Validity test methods

The validity test was conducted on the regression in market model and the normality assumption of the $\boldsymbol{AAR_t}$. The regression validation is done by analyzing the R^2 of the regression. The R^2 is the proportion of the total variation in the stock returns of the company that can be attributed to the linear relationship with the stock returns of the market (Larsen & Marx, 2012). In general, the higher the R^2, the better the model fits the data. The R^2 is calculated using the Excel RSQ function over the market returns and the company returns.

The second validation test was conducted on the normality assumption of the $\boldsymbol{AAR_t}$. We took the $\boldsymbol{AAR_t}$ over the estimation window and test for its normality using the q-q plot and chi-square test. The steps to conduct the q-q plot are shown below (Law, 2014):

1. Sorting the $\boldsymbol{AAR_t}$ of the estimation window from the lowest to the highest (so called the actual data).
2. Calculating the Cumulative Distribution Function (CDF) consecutively with the sorted actual data.
3. Calculating the expected value in normal distribution for each CDF using the Excel NORM.INV function.

4. Calculating the z-value for each CDF using the Excel NORM.S.INV function.
5. Plotting the actual data to the z-value to create the q-q- plot, then plotting the expected value to the z-value as a reference line.

To better have perspective at which extent we can sure that the probability of the $\boldsymbol{AAR_t}$ is indeed normal, we also conducted the chi-square test. The steps to conduct the chi-square test are shown below (Law, 2014):

1. Creating the bins which containing borders resulted from the expected value range.
2. Calculating the frequencies of both the expected data and the actual data in each bins.
3. Determining the chi-square test result using the Excel CHISQ.TEST function which is expressed in P-value.
4. If the P-value calculated is less than or equal to $\boldsymbol{\alpha}$, the hypothesis that the $\boldsymbol{AAR_t}$ is independent , identically, and normally distributed can be rejected at the $\boldsymbol{\alpha}$ level of significance (Law, 2014).

4.3 Reliability test methods

We conducted reliability tests by performing sensitivity analysis and reassessment using the constant mean return model. The independent variables that are used in the sensitivity analysis are the estimation window length and the event window length. We intend to see how the result of the assessment affected by the changes of these variables. The sensitivity analysis was done by creating different combinations of estimation window and event window then performing the assessment for each of the combinations.

The second reliability test is the reassessment using constant mean return model. In constant mean return model, the abnormal return ($\widehat{\boldsymbol{AR}}_{\boldsymbol{it}}$) of security i in period t is calculated using the formula in equation 3-12.

$$\widehat{\boldsymbol{AR}}_{\boldsymbol{it}} = R_{it} - \mu_i \tag{3-12}$$

R_{it} is the period-t returns on security i in the event window and $\boldsymbol{\mu_i}$ is the mean return of the security in the estimation window. The standard deviation of the abnormal return is calculated simply using the Excel STDEV function over the estimation window and then the variance of the abnormal return is the square of the standard deviation. Except for the calculation of the abnormal return and its variance, the sequence of the assessment using the constant mean return model is the same as previously explained. The intention to do the reassessment using the constant mean return model is to see if our data show significantly different results compared to the assessment using the market model, which explains its reliability.

5 Data collection

The fifth chapter of this thesis contains the explanation of the data collection, including the sources and the criteria of selection of each data used in the research.

5.1 List of listed palm oil companies in Singapore, Indonesia, and Malaysia

As stated in 1.3, this research is done in a scope of listed palm oil companies in Singapore, Indonesia, and Malaysia. We collected the list of the listed palm oil companies in this region through the Bloomberg database. The list was collected through the Equity Screening in the Bloomberg database with the criteria as shown below:

Trading status		
Acquired	Inactive	Private Company
Active	Liquidated	Suspended
Delisted	Pending Listing	Ticker Change
Expired	Pending Symbol	Unlisted
Halted	Postponed	
Security Attributes		
Show primary security of company only		
Indices		
Asia Pacific (Developed)		
Asia Pacific (Emerging)		
Country of Domicile		
Asia Pacific (Developed)		
Asia Pacific (Emerging)		
Company Description		
Palm Oil		

Table 3 – Criteria of the company screening in Bloomberg database

Among the list of companies resulted from the screening, we obtain 69 listed palm oil companies in Singapore, Indonesia, and Malaysia. It consists of 4 Singaporean companies, 18 Indonesian companies, and 47 Malaysian companies. To enrich the analysis of these listed palm oil companies, we also conducted further research about other significant corresponding descriptions of the company based on our literature review, such as the company's operations and the company status in RSPO. The list of the companies and their descriptions can be found in Appendix A.

5.2 List of events

5.2.1 The haze crisis in 2015

We analyzed all of the 69 palm oil companies in the haze crisis 2015 event. This is due to the nature of the reporting during the event which exposing the issues in the palm oil activities as the general issues in overall palm oil companies. Though some companies name who allegedly responsible for the fires eventually exposed, the impact of the crisis had already hit the overall palm oil companies in Singapore, Indonesia, and Malaysia as reported by Manuturi (2015) and Cushing (2015).

Data collection

To determine the event date as the input in our assessment, we created a timeline based on the news of the haze crisis as shown in Figure 4. The date on the timeline is the publication date of the news. This timeline is built based on the online articles written by Gunawan (2015), Samadhi (2015), Afrizal & Harahap (2015), Jacobson & Sirait (2015), and Manuturi (2015), respectively from the oldest to the newest date. Based on the timeline of the haze crisis, we determined the event date on the July 31, 2015, the day after the first news mentioning palm oil companies' role in the haze crisis published.

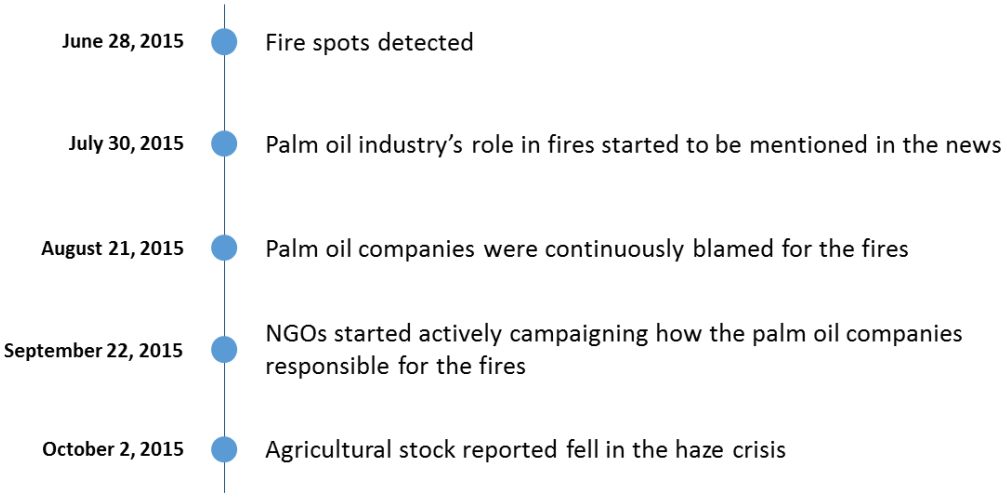

Figure 4 - Haze crisis 2015 timeline

To test the developed hypotheses in the haze crisis event, we divided the 69 palm oil companies based on the criteria in the hypotheses, which are their RSPO status, activities, and listing country. Table 4 shows number of samples for each determined criteria. The RSPO status and the activities data were gathered by checking the RSPO website and each of the palm oil company's website.

Criteria	No. of samples
Total samples	69
RSPO members	25
Upstream activities	59
Listed in Singapore	4
Listed in Indonesia	18
Listed in Malaysia	47

Table 4 - Number of samples in the haze crisis event assessment

5.2.2 The ESG issue reports

We focused on the cases that are reported in NGO publications for collecting ESG issues to be assessed in this research. To confirm the significance of the issues, we also set other criteria for the NGO reports that are collected, which are the name of the palm oil companies has to be mentioned on the title or the summary of the report, and it has been responded from the mentioned company. The cases that are collected are bounded in the period of 1st January 2009 until 1st July 2015. For the events exposing companies that have subsidiaries also listed either in Singapore, Indonesia, or Malaysia, we also put their subsidiaries in the list of samples to be assessed. This is the case for the ESG reports exposing Golden Agri Resources and Wilmar International, where we also put their subsidiaries, which are SMART and Wilmar Cahaya Indonesia respectively in the list of samples. Eventually, there are 36 samples of

Data collection

ESG issue reports that we assessed in this research to test hypothesis H2. The collected ESG issues can be found in Appendix B.

To test the other developed hypotheses in the ESG issue reports event, we divided the 36 samples based on each of criteria in the hypothesis, as shown in Table 5.

Criteria		No. of samples
Total samples		36
Issues	Environment destruction	12
	Biodiversity	7
	Social conflict	5
	Loss of customers or investors	5
	RSPO violated	5
	Governance	2
Year	2009	3
	2010	11
	2011	1
	2012	3
	2013	8
	2014	8
	2015	2
Listing country	Singapore	13
	Indonesia	18
	Malaysia	5

Table 5 - Number of samples of ESG issue reports

To test hypothesis H2a, we created cluster of issues and identified the cluster that has the direct impact on the sales of the companies. The cluster was basically created based on the definition on Table 1. However, we further differentiated reports that also mentioning the impact of the issues, such as the loss of customers and the sanction from RSPO. We also made a special cluster for biodiversity issue apart from the environment destruction, since this issue has special attention from the NGOs. Among all of the clusters, we determined the cluster that has the direct impact on the sales of the companies as the loss of customers or investors issues. The definition for each cluster is shown below:

- Environment destruction: All issues included in the "Environmental" column in Table 1, except the biodiversity issue;
- Biodiversity: All issues regarding the animal population and habitat which conflicted with the palm oil activities;
- Social conflict: All issues included in the "Social" column in Table 1;
- Loss of customers or investors: All issues mentioning the loss of customers or investors due to the ESG issues;
- RSPO violated: All issues mentioning the sanction from RSPO due to ESG issues;
- Governance: All issues included in the "Governance" column in Table 1.

Data collection

To avoid correlation between clusters, if a report contains more than one issue, we only put it in one cluster where the issue is the most highlighted in the report. We noticed that in some groups, the number of samples are relatively low. This could result in insignificance result of the test. As the consequences, not all the assessment results can be extracted into an inference.

5.2.3 The ESG commitment reports

The collected ESG commitments consist of the reports mentioning the palm oil companies pledge to improve their performance on ESG criteria and also the events when the palm oil companies joining RSPO. The reports that are collected are bounded in the same period as the ESG issue events which is 1st January 2009 until 1st July 2015. To test hypothesis H3, we eventually gathered 13 samples to be assessed. The collection of the ESG commitment can be found in Appendix C.

5.3 Stock prices of the assessed companies

We defined the securities in our event study model as the stock price of the palm oil companies that are exposed by the reports of the incident. The stock prices historical data of the listed palm oil companies in Singapore, Indonesia, and Malaysia that included in the assessment are extracted from the Bloomberg database. These data were extracted over a period of 1st January 2008 up to 30th November 2015, thus the requirement of the data period to do the event study can be covered.

To conduct the assessment based on the market model of the event study, we first need to define the market portfolio. We have two alternatives of market portfolio to be used in the assessment, which are the country indices and the crude palm oil (CPO) prices. We extracted the suitable indices' prices, including MXSG Index, MXID Index, and MXMY Index[1] as the first alternative of market portfolio for the palm oil companies in Singapore, Indonesia, and Malaysia respectively. The second alternative is the Malaysian Palm Oil Board Crude Palm Oil FOB Spot Prices (PAL2MALY Index), which also extracted from the Bloomberg database. PAL2MALY Index was chosen since it is also used as one of the crude palm oil price references both in Malaysia and Indonesia. The benefit from using the market model depends on the R^2 of the regression, where the higher R^2 the greater is the variance reduction of the abnormal return (MacKinlay, 1997). Therefore, we eventually will choose the market portfolio from the two alternatives based on the better R^2 in the first assessment to test H1.

The trading days that become our reference is the trading days of the biggest market cap securities among all of the companies, which is Wilmar International. From the extraction of the stock prices, we found some missing daily data in each of securities in the Bloomberg database. The missing daily data are the non-trading days and non-transactions days for the corresponding companies. We handled this missing data by inserting the stock price of the day before the missing data.

[1] The name of the index is as shown as the ticker in the Bloomberg database.

6 Results and analysis

We used Microsoft Excel to do the assessment of the collected data by inserting the formulas required to do the event study. The main objective of the assessment is to find the evidence whether we can reject the H0a of the event study.

H0a: The event has no impact on the behavior of the stock returns

Then, to compare the assessment result of the CAAR of each issues, we also conducted a statistical test to see whether we can reject the H0b of the significance of the differences.

H0b: The CAAR between two clusters of issues are equal

Both null hypotheses were rejected if the assessment resulted less or equal P-value than either significance level of $\boldsymbol{\alpha} = 10\%$, $\boldsymbol{\alpha} = 5\%$, or $\boldsymbol{\alpha} = 1\%$. Further in this report, we give an asterisk sign of *, **, or *** if the assessment result is significant respectively on $\boldsymbol{\alpha} = 10\%$, $\boldsymbol{\alpha} = 5\%$, or $\boldsymbol{\alpha} = 1\%$.

In this section, we describe and analyze the result of the assessment in the sequence of the developed hypotheses in chapter 3. Firstly, we present the choice of market portfolio used in the assessment. Furthermore, we also describe the reliability tests applying sensitivity analysis and reassessment using constant mean return model.

6.1 Market portfolio

The first assessment that we conducted is the comparison of R^2 between using the country indices (MXSG Index, MXID Index, and MXMY Index) and CPO prices (PAL2MALY Index) as market portfolio, which are resulted in the regression using the haze crisis in 2015 events and samples. The result of the assessment is shown in Table 6.

Haze crisis event date	July 31, 2015
Length event window	20
Length estimation window	250

Total samples	67

Market Portfolio	Average of R^2
The country indices	0.0739
CPO price	0.0177

Table 6 - Market portfolio assessment

There are two samples that we cannot use since their stock prices data are not sufficient to cover 250 estimation window days, thus the total samples are 67. Since the country indices result higher R^2 in the market model, it is the chosen market portfolio that is used in the further assessment. Moreover, as a note, we used 250 days as the length estimation window in all assessment as mentioned in 4.1, except later in the sensitivity analysis.

6.2 The haze crisis in 2015

As mentioned in 5.2.1, the determined event date for the haze crisis is July 31, 2015. Then, we determined the length of the event window of 20 days, considering the timeline of the haze crisis as shown in Figure 2. The first hypothesis that we assessed is hypothesis H1. The result of the assessment to test hypothesis H1 is shown in Table 7.

H1: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the haze crisis in 2015

Criteria	No. of samples	Event Window	Market model		
			CAAR	P-value	α
Total samples	67	20	-0.072	1.82E-07	***

Table 7 - H1 assessment result

The total samples for all the assessment under H1 is 67, due to the insufficient data in two securities. The result shows that the CAAR of the event is -7.2% with the P-value is less than significance level 1%. This result strongly rejects the H0a that the event has no effect, thus we cannot reject the H1 that the stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the haze crisis in 2015.

This result also can confirm the construct validity of our research. Given the already known reports from the news regarding the effect of the haze crisis to the stock price of agriculture index, our assessment behaved as expected. The assessment gave the same conclusion that the haze crisis negatively affected the stock prices, as also had been reported such as by Manuturi (2015) and Cushing (2015).

It is also interesting to see the haze crisis impact to the stock returns of the market portfolios that we use in the model, which are MXSG Index, MXID Index, and MXMY Index. We created the trend line of the market indices over the estimation window and the event window as seen in Figure 5, Figure 6, and Figure 7 respectively for the MXSG Index, MXID Index, and MXMY Index. Looking at these figures, these three indices had also downward trend during the haze crisis. However, the downward trend is seen starting from around 40 days prior to the event date. Macroeconomic factors, such as economic slowdown in China, have been reported as the driver of this downward trend (such as reported in Lee, 2015 and Suhartono & Ho, 2015). Nevertheless, we also tried to measure the Cumulative Abnormal Return (CAR) of each index using the constant mean return model in the event window and resulted the CAR of -0.11, -0.05, -0.01 respectively for the MXSG Index, MXID Index, and MXMY Index. The downward trend of the market indices is expected to affect the trend of the palm companies' stock as the downward trend of their normal returns. The fact that we still found the significant abnormal returns in the downward trend of the normal returns emphasizes the significant impact of the haze crisis in 2015 event.

Results and analysis

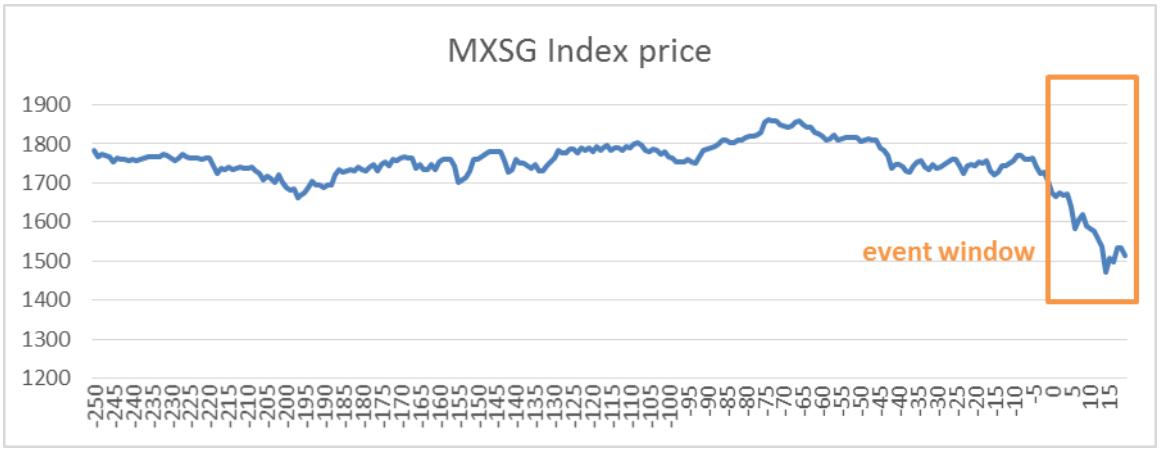

Figure 5 – MXSG Index trend

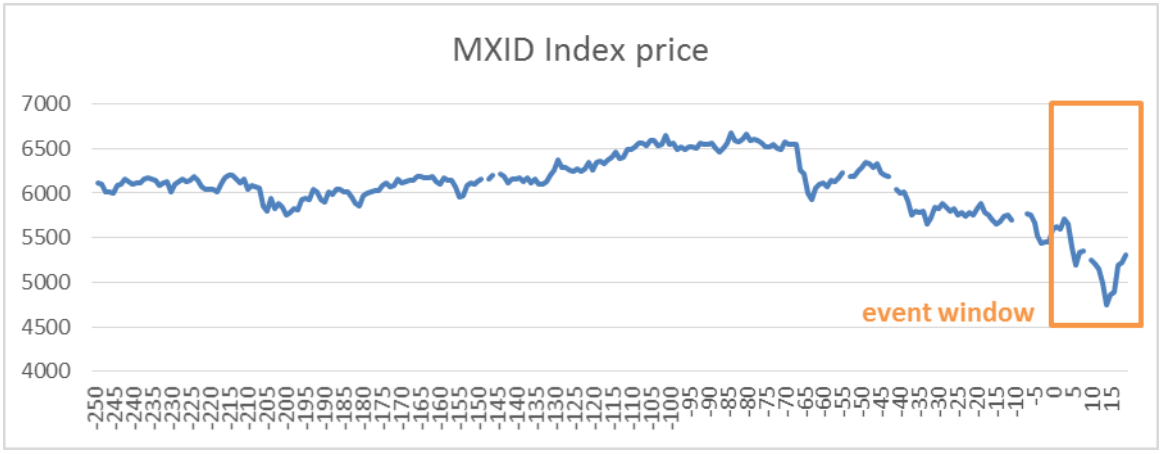

Figure 6 – MXID Index trend

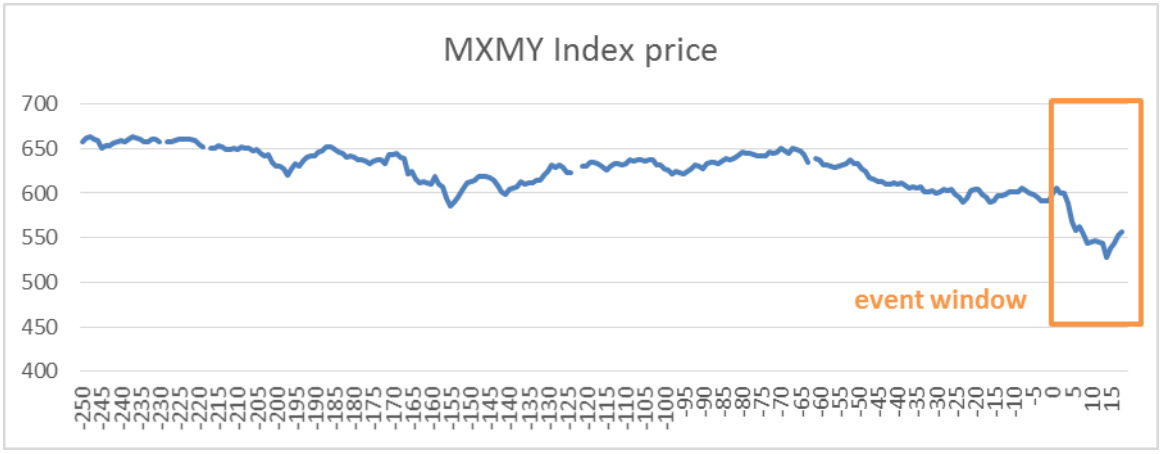

Figure 7 – MXMY Index trend

The next assessment is done to test H1a, which divided the samples into two clusters, the RSPO members and the non-RSPO members. The result of the assessment is shown in Table 8.

H1a: The Palm oil companies that are RSPO members show lower abnormal return (more negative) compared to non-RSPO members in the haze crisis 2015

Criteria	CAAR	VAR	W	P-value difference	α
RSPO members	-0.073	3.79E-04	-0.48	0.32	-
Non-RSPO members	-0.071	2.74E-04			

Table 8 - H1a assessment result

Using the Welch's approximation, the CAAR of both clusters do not show evidence to reject H0b (as shown in Table 8), thus we cannot support our alternative hypothesis of H1a. Table 9 shows that the CAAR of both RSPO members and Non-RSPO members are significant.

Criteria	No. of samples	Event Window	Market model	
			P-value	α
RSPO members	24	20	5.06E-04	***
Non-RSPO members	43	20	5.09E-05	***

Table 9 - H1a significance of the CAAR

The following division is done based on the activities of the palm oil companies. From the 67 available samples, there are only 10 companies who do not involved in the upstream companies. The result of the assessment can be seen in Table 10.

H1b: The Palm oil companies involved in upstream activities show lower abnormal return (more negative) compared to the companies that only involved in downstream activities in the haze crisis 2015

Criteria	CAAR	VAR	W	P-value difference	α
Upstream activities	-0.079	1.76E-04	-3.64	2.71E-03	***
Non-Upstream activities	-0.033	1.54E-03			

Table 10 - H1b assessment result

The difference of CAAR between both clusters is significance as shown in the Table 10, thus we have an evidence to reject H0b. Samples in the upstream activities group indeed show lower abnormal return, with the significant result to reject the H0a (as shown in Table 11). However, the samples in the non-upstream activities do not provide enough evidence to reject the H0a for the entire population, which is shown by the high p-value.

Criteria	No. of samples	Event Window	Market model	
			P-value	α
Upstream activities	57	20	9.83E-08	***
Non-Upstream activities	10	20	0.21	-

Table 11 - H1b significance of the CAAR

The last hypothesis to be assessed in the haze crisis in 2015 event is the hypothesis about the national variation. The result of the assessment for hypothesis H1c can be found in Table 12.

H1c: The palm oil companies listed in Indonesia show the worst abnormal return, while the palm oil companies listed in Singapore show the best abnormal return among the three countries in the haze crisis 2015

Criteria	CAAR	VAR	W	P-value difference	α
Listed in Singapore	-0.035	1.07E-03	5.12	3.45E-03	***
Listed in Indonesia	-0.126	7.63E-04			
Listed in Singapore	-0.035	1.07E-03	1.28	1.45E-01	-
Listed in Malaysia	-0.056	2.32E-04			
Listed in Indonesia	-0.126	7.63E-04	-9.59	8.43E-09	***
Listed in Malaysia	-0.056	2.32E-04			

Table 12 - H1c assessment result

The difference between the CAAR of the listed companies in Singapore and Indonesia is significant, and so does the difference between the CAAR of the listed companies in Indonesia and Malaysia. Therefore the H0b for each of these two comparisons can be rejected. However, we do not have enough evidence to reject the H0b for the comparison of the CAAR of the listed companies in Singapore and Malaysia. Based on the assessment result, the CAAR in Indonesia indeed drives the CAAR of the total samples. It shows the worst abnormal return compared to the other two countries, with significant low p-value, thus the H0a is strongly rejected (as shown in Table 13). However, there are only 4 samples representing companies listed in Singapore which produce insignificant result.

Criteria	No. of samples	Event Window	Market model	
			P-value	α
Listed in Singapore	4	20	0.18	-
Listed in Indonesia	16	20	1.86E-04	***
Listed in Malaysia	47	20	2.80E-04	***

Table 13 - H1c significance of the CAAR

6.3 The ESG issue reports

In this section, we describe and analyze the result of the assessment of the ESG issue reports. The samples used in this assessment can be found in Appendix B. Since some of the event date (publication date of the reports) fell on the non-trading days, we had to adjust some of the event date to the nearest trading days after the firstly defined event date. The adjusted event date is shown in Table 14.

No	Company	Issue	Adjusted event date	Citation
1	Kuala Lumpur Kepong	RSPO violated	November 17, 2014	(Saturi, 2014)
2	Wilmar	Biodiversity	October 21, 2013	(Greenpeace, 2013)
3	Wilmar Cahaya Indonesia	Biodiversity	October 21, 2013	(Greenpeace, 2013)

Table 14 – Adjusted event date

The first hypothesis that we assessed for the ESG issue reports events is hypothesis H2. The result of the assessment to test hypothesis H2 is shown in Table 15.

H2: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the ESG issue reports in 2009 – June 2015

Criteria	No. of samples	Event Window	Market model		
			CAAR	P-value	α
Total samples	36	2	-0.008	0.088	*

Table 15 - H2 assessment result

The assessment results p-value of 0.088, thus we have an evidence to reject H0a significantly at the level $\boldsymbol{\alpha} = 10\%$. Looking at the CAAR resulted from the assessment, we have a figure showing that the event negatively affected the stock return, although the effect is relatively low.

The next assessment is done to each of the issues. To test the hypothesis H2a, we first divided the cluster into two groups, which are the issues that have direct impact to sales and not. The issue that have direct impact to sales is the loss of customers or investors issue, while the others are categorized as issues that have no direct impact to sales. After that, we also will see the assessment result for each of the issues.

H2a: The ESG issue reports in 2009 - June 2015 that have a direct impact on the sales of the palm oil companies in Singapore, Indonesia, and Malaysia result the lowest abnormal return among other ESG issues

Criteria	CAAR	VAR	W	P-value difference	α
Direct impact to sales	-0.0182	3.76E-04	-1.30	0.13	-
Non - Direct impact to sales	-0.0068	4.01E-05			

Table 16 - H2a assessment result part 1

From the assessment result shown in Table 16, the CAAR of the group that has direct impact to sales is higher than the group that does not have direct impact to sales. However, the difference of the two clusters is not significance, thus we cannot reject H0b. These two clusters also result p-value higher than significance level of 10% from the assessment, thus there is not enough evidence to reject the H0a on each cluster (as shown in Table 17).

Criteria	No. of samples	Event Window	Market model	
			P-value	α
Direct impact to sales	5	2	0.20	-
Non - Direct impact to sales	31	2	0.15	-

Table 17 - H2a significance of the CAAR

H2b: The ESG issue reports published in more recent years result in more negative impact on the stock return of the palm oil companies in Singapore, Indonesia, and Malaysia

Criteria	CAAR	VAR	W	P-value difference	α
2009 - 2012	-0.015	9.53E-05	-4.68	2.65E-05	***
2013 - 2015	-0.002	5.25E-05			

Table 18 - H2b assessment result of two clusters of the years

We tried to make two clusters of the years, the cluster containing issues in 2009 – 2012 and the cluster containing issues in 2013 – 2015, which gave us equal sample size for each cluster. As seen in Table 18, the difference of the two clusters is significant, but the CAAR in 2009-2012 group is more negative instead, thus it does not support the H2b. Looking solely at the CAAR in Table 20, we do not found an obvious trend whether the CAAR is becoming more negative in each increasing years. Therefore, it is unlikely that the driver of the significant result of two clusters in Table 18 is the difference of the years.

Criteria	No. of samples	Event Window	Market model	
			P-value	α
2009 - 2012	18	2	0.070	*
2013 - 2015	18	2	0.410	-

Table 19 - H2b significance of the CAAR

Criteria	No. of samples	Event Window	Market model		
			CAAR	P-value	α
2009	3	2	-0.0182	0.33	-
2010	11	2	-0.0170	0.10	*
2011	1	2	-	-	-
2012	3	2	-0.0084	0.31	-
2013	8	2	0.0019	0.44	-
2014	8	2	-0.0029	0.38	-
2015	2	2	-0.0110	0.34	-

Table 20 - The CAAR of each years

The last hypothesis to be assessed in the ESG issue reports event is the national variation. The result of the assessment can be seen in Table 21.

H2c: The palm oil companies listed in Indonesia show the worst abnormal return, while the palm oil companies listed in Singapore show the best abnormal return among the three countries in the impact of the ESG issue reports in 2009 – June 2015

The differences of the CAAR of the three countries are significance, thus we have evidence to reject H0b for all of the comparisons as shown in Table 21. However, The CAAR of all of the countries show insignificant results, since the p-value in all groups are higher than the significance level of 10%, as shown in Table 22. Looking at the CAAR, Indonesia indeed shows the worst abnormal return, but it is Malaysia that has the best abnormal return.

Criteria	CAAR	VAR	W	P-value difference	α
Singapore	-0.0063	6.10E-05	2.03	2.59E-02	**
Indonesia	-0.0130	1.12E-04			
Singapore	-0.0063	6.10E-05	-2.34	2.58E-02	**
Malaysia	0.0028	5.24E-05			
Indonesia	-0.0130	1.12E-04	-3.88	1.88E-03	***
Malaysia	0.0028	5.24E-05			

Table 21 - H2c assessment result

Criteria	No. of samples	Event Window	Market model	
			P-value	α
Singapore	13	2	0.22	-
Indonesia	18	2	0.12	-
Malaysia	5	2	0.36	-

Table 22 - H2c significance of the CAAR

6.4 The ESG commitment reports

Appendix C shows the collected samples that we assessed to test the hypothesis H3. The result of the assessment is shown in Table 23.

H3: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are positively affected by the ESG commitment reports in 2009 – June 2015

Criteria	No. of samples	Event Window	Market model		
			CAAR	P-value	α
Total samples	12	2	0.001	0.480	-

Table 23 - H3 assessment result

There is one sample that do not provide sufficient data to cover 250 estimation days, thus our number of samples become 12. Looking at the p-value, we again do not have enough evidence to reject the H0a for this set of samples.

6.5 Validation analysis

6.5.1 R^2 analysis

We extracted the suitable indices' prices, including MXSG Index, MXID Index, and MXMY Index as the market portfolio for the palm oil companies in Singapore, Indonesia, and Malaysia respectively. The R^2 is the proportion of the total variation in the stock returns of each of the companies that can be attributed to the linear relationship with the stock returns of their corresponding market indices (Larsen & Marx, 2012). In general, the higher the R^2, the better the model fits the data. Table 24 shows the resulted R^2 in the market model regression.

	R^2			
	Total Samples	**Singapore**	**Indonesia**	**Malaysia**
Average	0.07	0.13	0.05	0.08
Highest	0.27	0.24	0.16	0.27
Lowest	4.28E-05	0.06	4.28E-05	3.97E-04

Table 24 – R^2 results

Looking at our R^2 results, it can be inferred that the proportion of the total variation in the stock returns that can be explained by the variation of the market indices is very low. The plausible reasons for the low R^2 are the different characteristic between the industries driving the market indices and the palm oil industry, the effect of using closed prices rather than adjusted close, and the non-synchronous trading. We provide the top fund holdings in each market indices in Appendix D. It shows that except Malaysia, none of the top fund holdings in other two country indices are the agriculture industries.

The effect of using closed prices and the non-synchronous trading can result in biased and inconsistent β in the regression estimates. However, the assessed variable in the event study is the abnormal return, and not the result of the regression itself, which is the normal return. Hence, the possible failures resulted from using closed prices and the non-synchronous trading do not result in misspecification of the event study model. By construction, the cumulative abnormal returns of all companies in the estimation window sum to zero, so that a bias in the estimate of β is compensated for a bias in α (Brown & Warner, 1985). Therefore, regardless of the quality of the regression, if the event window shows stationarity compared to the estimation window, the cumulative abnormal returns can be shown to also have a mean equal to zero (Brown & Warner, 1985)..

Nevertheless, the market model can improve the constant mean return model by removing the portion of the return that is related to variation in the market's return, thus the variance of the abnormal return is reduced (MacKinlay, 1997). This benefit can be achieved if we have sufficiently high R^2 for the variance reduction of the abnormal return (MacKinlay, 1997). Therefore, the low R^2 may not show the misspecification of the event study using market model, but it shows that the model is not optimal to reduce the variance of the abnormal returns.

6.5.2 Normality tests

The second validation test was conducted on the normality assumption of the $\boldsymbol{AAR_t}$. We took the $\boldsymbol{AAR_t}$ over the estimation window and test for its normality using the q-q plot and chi-square test. The chi-square test is expressed in P-value. If the P-value calculated is less than or equal to $\boldsymbol{\alpha}$, the hypothesis that the $\boldsymbol{AAR_t}$ is independent, identically, and normally distributed (H0c) can be rejected at the $\boldsymbol{\alpha}$ level of significance (Law, 2014). For this normality test, we took $\boldsymbol{\alpha}$ = 5%.

H0c: The $\boldsymbol{AAR_t}$ samples are independent, identically distributed, and normally distributed

The central limit theorem guarantees that if the abnormal returns in the securities are independent and identically distributed, the distribution of $\boldsymbol{AAR_t}$ converges to normality as the number of samples of securities increases (Brown & Warner, 1985). Therefore, we also compared the result of the normality test with the sample size of each groups.

The tested groups are the overall samples in the haze crisis event (67 samples), the ESG issues reports (36 samples), the ESG commitment reports (12 samples), and the group that has the least number of samples which is the listed companies in Singapore in the haze crisis event analysis (4 samples). Figure 8, Figure 9 Figure 10, and Figure 11 show the q-q plots respectively for each group. The blue dots are the plotted actual data, and the orange line is the reference line showing expected normally distributed data. The first two figures indicating that the actual data of $\boldsymbol{AAR_t}$ mostly fit to the expected normally distributed data, though some deviations are clearly seen in the tail of the distributions. On the other hand, the last two figures show a lot of deviations from the reference line, indicating that they are not fit into the normal distribution.

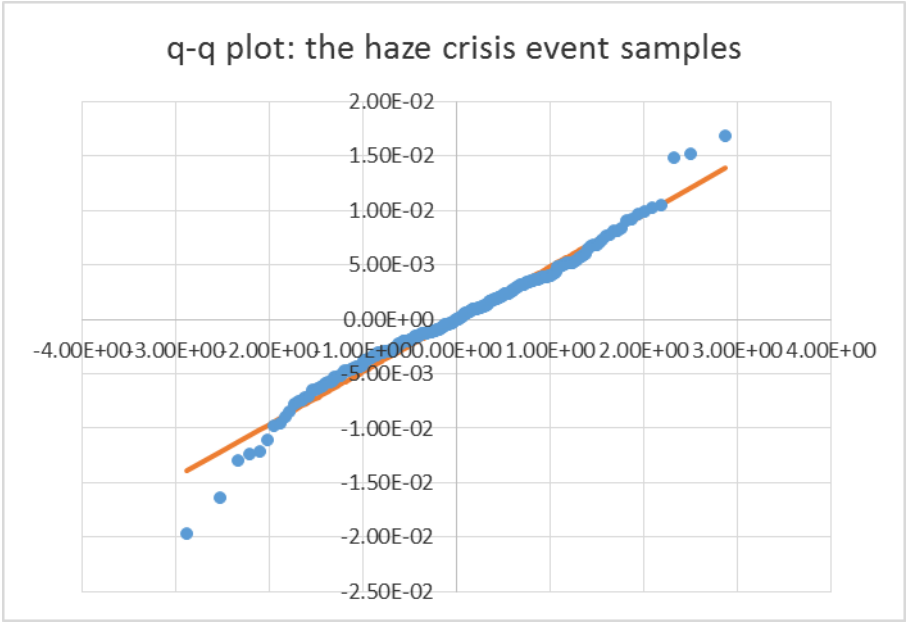

Figure 8 - q-q plot: the haze crisis event samples

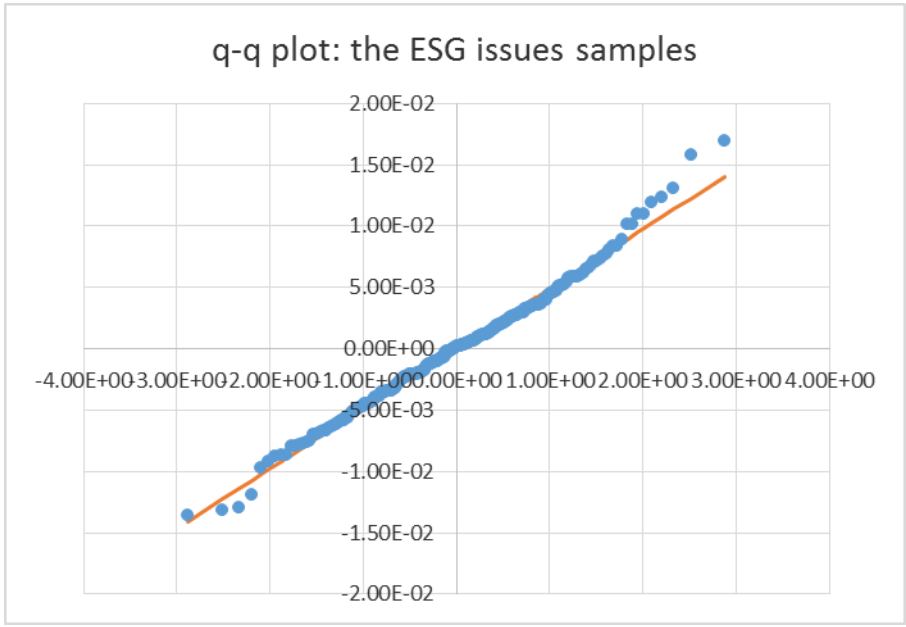

Figure 9 - q-q plot: the ESG reports samples

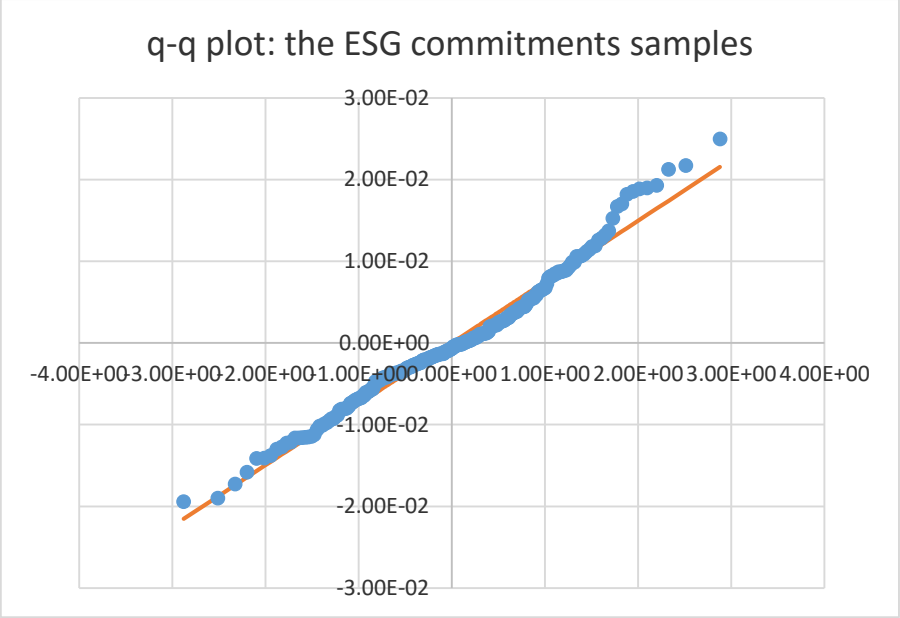

Figure 10 - q-q plot: the ESG commitments samples

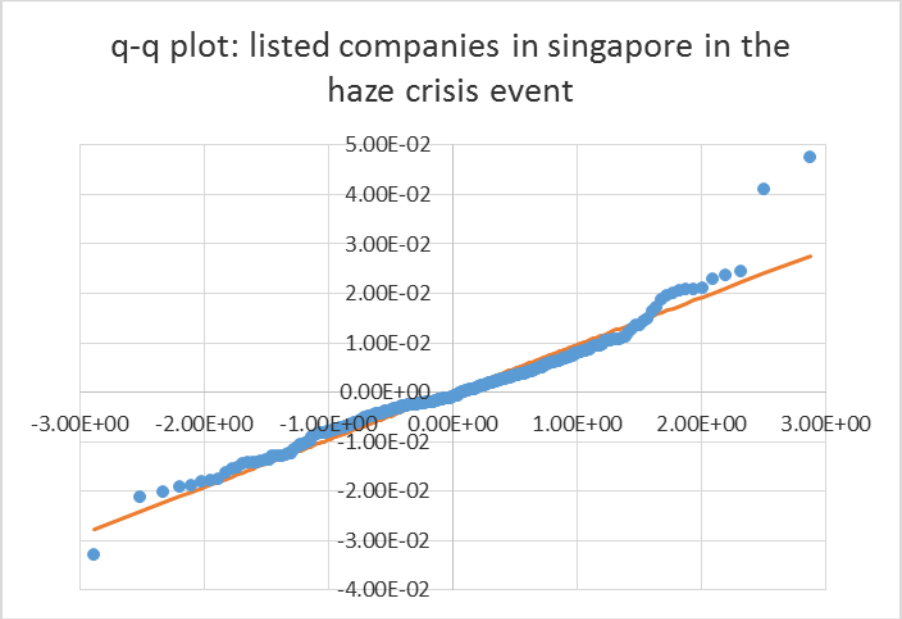

Figure 11 - q-q plot: the listed companies in Singapore in the haze crisis event

To better have perspective at which extent we can sure that the probability of the $\boldsymbol{AAR_t}$ is indeed normal, we looked at the result of the chi-square test, which is shown in Table 25.

	Number of samples	Chi-square test results	Reject H0c?
The haze crisis event	67	1.66E-01	no
The ESG issues reports	36	3.18E-01	no
The ESG commitment reports	12	8.58E-07	yes
The listed companies in Singapore in the haze crisis event	4	9.76E-15	yes

Table 25 - the chi-square test results

Results and analysis

The chi-square results conclude that there is no evidence to reject the H0c that the $\boldsymbol{AAR_t}$ samples in the haze crisis event and the ESG issues reports are independent, identically, and normally distributed. On the other hand, the H0c for each of the ESG commitment reports and the group of the listed companies in Singapore in the haze crisis event analysis is rejected. This shows that the validity of the assessment model relies on the number of the samples. The low number of samples can result in the violation of the assumption of normality.

6.6 Sensitivity analysis

We conducted the sensitivity analysis by creating different combinations of estimation window and event window by either adding or decreasing the days in each window, then performing the assessment for each of the combinations. The sensitivity analysis was done to each group of events and the clusters in each group. The intention is to see how the result of the assessment affected by the changes of these variables. We also measured the significance of the result differences using the same method to measure the significance of the cluster differences, thus the null hypothesis for the sensitivity analysis is as shown in H0d.

H0d: The sensitivity analysis result is equal to the initial result.

We present the sensitivity analysis result in a table, where the green highlighted cells show the significance result to reject H0a and the red highlighted cells show the significance result to reject H0d, using the significance level of $\boldsymbol{\alpha} = 5\%$.

6.6.1 Sensitivity analysis on event window

1. The haze crisis in 2015

Our initial event window for the haze crisis in 2015 is 20 days. We conducted the sensitivity analysis by comparing the results using the event window of 10 days and 30 days. The result of this sensitivity analysis is shown in Table 26. The sensitivity analysis results show that the changes of the event window significantly produced different results of the CAAR, except for the cluster of the companies listed in Singapore. Our initial event window of 20 days resulted the lowest abnormal return compared to the event window of 10 and 30 days in all clusters.

However, the market model in most of the clusters still resulted the same inferences whether to reject H0a or not. For the hypothesis using the total samples of the haze crisis in 2015 event (H1), using either the event window of 10, 20, or 30 days, we have enough evidence to reject H0a, thus we cannot reject the hypothesis that the stock returns of the palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected the haze crisis in 2015. We also have the same inferences for the cluster of the companies of upstream activities and listed in Indonesia. Therefore, the event study inferences on the haze crisis in 2015 is not sensitive to the changes of the event window length.

Criteria	Event Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
Total samples	10	-0.022	7.45E-03	***	6.42E-51	***
	20	-0.072	1.82E-07	***	-	-
	30	-0.045	2.46E-03	***	5.43E-20	***

Results and analysis

Criteria	Event Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
RSPO members	10	-0.031	1.81E-02	**	6.27E-11	***
	20	-0.073	5.06E-04	***	-	-
	30	-0.041	5.10E-02	*	2.54E-06	***
Non-RSPO members	10	-0.018	6.66E-02	*	5.04E-28	***
	20	-0.071	5.09E-05	***	-	-
	30	-0.048	1.14E-02	**	6.27E-08	***
Upstream activities	10	-0.031	9.60E-04	***	5.18E-41	***
	20	-0.079	9.83E-08	***	-	-
	30	-0.056	5.44E-04	***	3.29E-13	***
Non-Upstream activities	10	0.023	2.10E-01	-	9.27E-04	***
	20	-0.033	2.10E-01	-	-	-
	30	0.015	3.77E-01	-	1.21E-02	**
Listed in Singapore	10	-0.012	3.23E-01	-	1.45E-01	-
	20	-0.035	1.79E-01	-	-	-
	30	-0.026	2.79E-01	-	3.70E-01	-
Listed in Indonesia	10	-0.041	2.68E-02	**	6.10E-11	***
	20	-0.126	1.86E-04	***	-	-
	30	-0.090	8.89E-03	***	1.31E-03	***
Listed in Malaysia	10	-0.017	5.96E-02	*	1.36E-24	***
	20	-0.056	2.80E-04	***	-	-
	30	-0.032	4.82E-02	**	1.82E-10	***

Table 26 - Sensitivity analysis on event window of the haze crisis in 2015 group

2. The ESG issue reports

Our initial event window for the ESG issue reports event is two days. The sensitivity analysis was done by conducting reassessment using event window of 1 day and 1 week (7 days). The result of the sensitivity analysis can be seen in Table 27.

Criteria	Event Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
Total samples	1	-0.0014	3.7E-01	-	2.3E-07	***
	2	-0.0084	8.8E-02	*	-	-
	7	-0.0104	1.8E-01	-	1.7E-01	-
Direct impact to sales	1	0.0017	4.5E-01	-	5.2E-02	*
	2	-0.0182	2.0E-01	-	-	-
	7	-0.0426	1.5E-01	-	1.2E-01	-
Non - Direct impact to sales	1	-0.0019	3.4E-01	-	4.5E-04	***
	2	-0.0068	1.5E-01	-	-	-
	7	-0.0052	3.3E-01	-	2.6E-01	-
2009 - 2012	1	-0.0052	2.3E-01	-	7.3E-04	***
	2	-0.0151	7.0E-02	*	-	-
	7	-0.0047	4.0E-01	-	2.2E-02	**

Criteria	Event Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
2013 - 2015	1	0.0024	3.2E-01	-	3.0E-02	**
	2	-0.0017	4.1E-01	-	-	-
	7	-0.0161	1.3E-01	-	2.6E-04	***
Singapore	1	-0.0021	4.0E-01	-	9.1E-02	*
	2	-0.0063	2.2E-01	-	-	-
	7	-0.0169	2.6E-02	**	1.0E-03	***
Indonesia	1	0.0008	4.6E-01	-	4.7E-05	***
	2	-0.0130	1.2E-01	-	-	-
	7	-0.0060	3.8E-01	-	9.7E-02	*
Malaysia	1	-0.0074	1.1E-01	-	1.8E-02	**
	2	0.0028	3.6E-01	-	-	-
	7	-0.0097	2.6E-01	-	5.9E-02	-

Table 27 - Sensitivity analysis on event window of the ESG issue reports group

In most cases, the CAAR that was resulted from 1 day event window is significantly different with our initial analysis. However, in all analysis using different event windows, we still have the same inference which there is not sufficient evidence to reject H0a, using the significance level of $\boldsymbol{\alpha} = 5\%$. Therefore, the event study inferences on the ESG issue reports is also not sensitive to the changes of the event window length.

3. The ESG commitment reports

We conducted the sensitivity analysis for the ESG commitment reports events with the same approach as the previous analysis. We reassessed our set of samples, which initially use event window of 2 days, with the event window of 1 day and 7 days. The result of the sensitivity analysis is presented in Table 28. We do not find evidence to reject the H0d for this set of samples. For the inferences of the hypothesis H3, we still got the same result which we do not have enough evidence to reject H0a.

Criteria	Event Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
Total samples	1	0.0021	0.39	-	0.35	-
	2	0.0006	0.48	-	-	-
	7	0.0049	0.41	-	0.26	-

Table 28 - Sensitivity analysis on event window of the ESG commitment reports group

The result of this sensitivity analysis is the event study inferences on the ESG commitment reports are not sensitive to the changes of the event window length.

6.6.2 Sensitivity analysis on estimation window

1. The haze crisis in 2015

To conduct the sensitivity analysis on the estimation window, we reassessed our set of samples in the haze crisis in 2015 event using different estimation window length, which are 150 and 100 days. The reason we did not use the length of estimation window more than our initial length is due to the

insufficient data in some samples to cover more than 250 days for the estimation day length. The result of the first sensitivity analysis on estimation window length is shown in Table 29.

Criteria	Estimation Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
Total samples	250	-0.072	1.82E-07	***	-	-
	150	-0.093	1.77E-10	***	5.17E-17	***
	100	-0.089	1.14E-09	***	1.79E-12	***
RSPO members	250	-0.073	5.06E-04	***	-	-
	150	-0.078	3.53E-04	***	2.03E-01	-
	100	-0.079	4.96E-04	***	1.53E-01	-
Non-RSPO members	250	-0.071	5.09E-05	***	-	-
	150	-0.101	8.45E-08	***	3.89E-13	***
	100	-0.094	3.73E-07	***	2.77E-09	***
Upstream activities	250	-0.079	9.83E-08	***	-	-
	150	-0.098	3.28E-10	***	2.84E-12	***
	100	-0.095	1.40E-09	***	1.50E-09	***
Non-Upstream activities	250	-0.033	2.10E-01	-	-	-
	150	-0.064	6.58E-02	-	4.65E-02	**
	100	-0.054	9.86E-02	-	1.20E-01	-
Listed in Singapore	250	-0.035	1.79E-01	-	-	-
	150	-0.041	1.64E-01	-	4.18E-01	-
	100	-0.057	1.02E-01	-	2.08E-01	-
Listed in Indonesia	250	-0.126	1.86E-04	***	-	-
	150	-0.125	2.25E-04	***	4.52E-01	-
	100	-0.127	4.04E-04	***	4.67E-01	-
Listed in Malaysia	250	-0.056	2.80E-04	***	-	-
	150	-0.086	3.08E-07	***	1.12E-15	***
	100	-0.079	1.56E-06	***	1.30E-10	***

Table 29 - Sensitivity analysis on the estimation window of the haze crisis in 2015 group

Though there are some significant differences CAAR in some clusters, the inferences in each cluster whether to reject H0a or not are still the same. Looking at the total samples, we can still strongly reject H0a, thus we cannot reject our H1. This sensitivity analysis indicates that the event study inferences on the haze crisis in 2015 are not sensitive to the changes on the estimation window length.

2. The ESG issue reports

We used the same combination of the estimation window length to do the sensitivity analysis of the ESG issue reports event. We found that the results are not sensitive to the changes of the estimation window length, since there are no significant difference between the results. Looking at the total samples, we got stronger evidence to reject H0a using estimation window length of 100 days, though the CAAR is not significantly different with the one resulted in our initial assessment. The result of the sensitivity analysis can be seen in Table 30.

Criteria	Estimation Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
Total samples	250	-0.0084	8.8E-02	*	-	-
	150	-0.0094	6.0E-02	*	2.4E-01	-
	100	-0.0097	4.9E-02	**	1.7E-01	-
Direct impact to sales	250	-0.0182	2.0E-01	-	-	-
	150	-0.0160	2.1E-01	-	4.3E-01	-
	100	-0.0171	1.8E-01	-	4.6E-01	-
Non - Direct impact to sales	250	-0.0068	1.5E-01	-	-	-
	150	-0.0083	9.4E-02	*	1.7E-01	-
	100	-0.0085	8.6E-02	*	1.4E-01	-
2009 - 2012	250	-0.0151	7.0E-02	*	-	-
	150	-0.0154	5.1E-02	*	4.6E-01	-
	100	-0.0161	4.3E-02	**	3.7E-01	-
2013 - 2015	250	-0.0017	4.1E-01	-	-	-
	150	-0.0034	3.3E-01	-	2.5E-01	-
	100	-0.0033	3.3E-01	-	2.5E-01	-
Singapore	250	-0.0063	2.2E-01	-	-	-
	150	-0.0065	2.1E-01	-	4.7E-01	-
	100	-0.0063	2.2E-01	-	4.9E-01	-
Indonesia	250	-0.0130	1.2E-01	-	-	-
	150	-0.0146	8.9E-02	*	3.2E-01	-
	100	-0.0155	7.5E-02	*	2.4E-01	-
Malaysia	250	0.0028	3.6E-01	-	-	-
	150	0.0021	3.9E-01	-	4.3E-01	-
	100	0.0025	3.7E-01	-	4.7E-01	-

Table 30 - Sensitivity analysis on the estimation window of the ESG issue reports group

We also can conclude that the event study results on the ESG issue reports group are not sensitive to the changes on the estimation window length.

3. The ESG commitment reports

Using the same combination of estimation window length as the previous analysis, we also did not find significant difference on the CAAR results of the assessment in the ESG commitment reports event. Therefore, the inferences in each different estimation window length is still the same, which we do not have enough evidence to reject H0a. Therefore, the event study results on the ESG commitment reports are also not sensitive to the changes of the estimation window length. The result of the sensitivity analysis can be found in Table 31.

Criteria	Estimation Window	Market model			P-value difference	α difference
		CAAR	P-value	α		
Total samples	250	0.0006	0.48	-	-	-
	150	0.0022	0.42	-	0.35	-
	100	0.0050	0.31	-	0.15	-

Table 31 - Sensitivity analysis on the estimation window of the ESG commitment reports group

6.7 Constant mean return model

The second reliability test is the reassessment using constant mean return model. We did the reassessment using constant mean return model to each group of events and the clusters in each group. The reassessment used the same event window and estimation window length as our initial assessment. The significance of the result differences is then measured using the same method as the previous analysis, thus the null hypothesis for this reassessment is as shown in H0e.

H0e: The assessment results using constant mean return model is equal with the assessment results using market model.

We present the sensitivity analysis result in a table, where the green highlighted cells show the significance result to reject H0a and the red highlighted cells show the significance result to reject H0e, using the significance level of $\boldsymbol{\alpha} = 5\%$.

1. The haze crisis in 2015

Comparing the results between the assessment using market model and constant mean return model in the haze crisis in 2015 group, we found that the CAAR results of the two models are significantly different. However, the inferences that we got from the statistical test are still consistent in both models. Both using market model and constant mean return model, we cannot reject the hypothesis that the stock returns of the palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected the haze crisis in 2015. The result of the comparison using constant mean return model for the haze crisis in 2015 group can be seen in Table 32.

Criteria	No. of samples	Model	CAAR	P-value	α	P-value difference	α difference
Total samples	67	MM	-0.072	1.82E-07	***	3.53E-36	***
	67	CMRM	-0.111	2.11E-12	***		
RSPO members	24	MM	-0.073	5.06E-04	***	2.33E-06	***
	24	CMRM	-0.103	1.62E-05	***		
Non-RSPO members	43	MM	-0.071	5.09E-05	***	2.51E-20	***
	43	CMRM	-0.115	1.79E-08	***		
Upstream activities	57	MM	-0.079	9.83E-08	***	3.54E-26	***
	57	CMRM	-0.113	1.14E-11	***		
Non-Upstream activities	10	MM	-0.033	2.10E-01	-	1.56E-03	***
	10	CMRM	-0.095	2.28E-02	**		
Listed in Singapore	4	MM	-0.035	1.79E-01	-	6.64E-03	***
	4	CMRM	-0.124	1.82E-02	**		
Listed in Indonesia	16	MM	-0.126	1.86E-04	***	3.35E-01	-
	16	CMRM	-0.130	1.63E-04	***		
Listed in Malaysia	47	MM	-0.056	2.80E-04	***	1.19E-25	***
	47	CMRM	-0.103	2.39E-08	***		

Table 32 - Constant mean return model comparison in the haze crisis in 2015 group

Since we have the same inferences in most of cases using both models, it can be concluded that our initial assessment model is reliable.

2. The ESG issue reports

We have a more robust model in assessing the ESG issue reports events. Table 33 shows that the CAAR resulted from both market model and constant mean return model have no significant differences. Therefore, our inference for this group of events is still no evidence to reject H0e at significance level of $\boldsymbol{\alpha} = 5\%$.

Criteria	No. of samples	Model	CAAR	P-value	α	P-value difference	α difference
Total samples	36	MM	-0.008	8.84E-02	*	2.25E-01	-
	36	CMRM	-0.007	1.45E-01	-		
Direct impact to sales	5	MM	-0.018	2.01E-01	-	4.25E-01	-
	5	CMRM	-0.016	2.51E-01	-		
Non - Direct impact to sales	31	MM	-0.007	1.46E-01	-	2.94E-01	-
	31	CMRM	-0.006	2.05E-01	-		
2009 - 2012	18	MM	-0.015	7.03E-02	*	1.47E-01	-
	18	CMRM	-0.011	1.62E-01	-		
2013 - 2015	18	MM	-0.002	4.10E-01	-	2.81E-01	-
	18	CMRM	-0.003	3.41E-01	-		
Singapore	13	MM	-0.006	2.18E-01	-	2.29E-01	-
	13	CMRM	-0.009	1.80E-01	-		
Indonesia	18	MM	-0.013	1.18E-01	-	1.19E-01	-
	18	CMRM	-0.009	2.31E-01	-		
Malaysia	5	MM	0.003	3.58E-01	-	4.20E-01	-
	5	CMRM	0.002	4.21E-01	-		

Table 33 – Constant mean return model comparison in the ESG issue reports group

3. The ESG commitment reports

The same with the ESG issue reports group, both market model and constant mean return model resulted consistent CAAR result, which gave us the inference that there is no evidence to reject H0a. Therefore, our initial model is reliable.

Criteria	No. of samples	Model	CAAR	P-value	α	P-value difference	α difference
Total samples	12	MM	0.0006	0.48	-	0.29	-
	12	CMRM	0.0030	0.40	-		

Table 34 – Constant mean return model comparison in the ESG commitment reports

7 Conclusion and recommendations

In this last chapter, we present the conclusion of the research based on our analysis on the assessment results. Furthermore, we also provide the recommendations for further improvement in this research.

7.1 Conclusion

This research aims to investigate how actually the ESG issues affect the performance of the investment on the palm oil activities and examine whether the ESG issues of the palm oil companies expose a risk of loss to the investor's investment, especially in Singapore, indonesia, and Malaysia. Therefore, the objective is to provide an assessment how the ESG issues affect the stock return of the investment in the listed palm oil companies in the region.

We divided the events on this research into three main groups, which are the haze crisis in 2015, the ESG issue reports, and the ESG commitment reports. For each of the groups, we developed main hypotheses and also sub-hypotheses to be assessed in our developed model. The following explanation provides the conclusion of each main hypotheses.

H1: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the haze crisis in 2015.

Our assessment resulted a significant evidence to reject the H0a on the significance level of 1%, thus we cannot reject the H1. The significant negative CAAR confirm that the stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the haze crisis in 2015, as bad as -7.2%. Given the already known reports from the news regarding the effect of the haze crisis to the stock price of agriculture index, this result also confirm the construct validity of our research.

Table 35 provides the overview of the assessment result for the haze crisis in 2015 group. Looking at the clusters that also have significant result to reject H0a, we have an additional insight that the negative impact is mostly driven by the palm oil companies which included as RSPO members, involved in upstream activities, and listed in Indonesia.

	Criteria	No. of samples	Event Window	Market model	
				CAAR	P-value[2]
H1	Total samples	67	20	-0.072	1.82E-07
H1a	RSPO members	24	20	-0.073	5.06E-04
	Non-RSPO members	43	20	-0.071	5.09E-05
H1b	Upstream activities	57	20	-0.079	9.83E-08
	Non-Upstream activities	10	20	-0.033	2.10E-01
H1c	Listed in Singapore	4	20	-0.035	1.79E-01
	Listed in Indonesia	16	20	-0.126	1.86E-04
	Listed in Malaysia	47	20	-0.056	2.80E-04

Table 35 - The overview of H1 results

[2] The green highlight shows the significant results using significance level of α=5%

Conclusion and recommendations

Hypothesis H1a and H1c were developed with the assumption that the more the investors in a cluster consider sustainability, the worse the abnormal return in that cluster in the haze crisis event. The result of our assessment is in line with this assumption, thus it can give an insight that the impact of the ESG issues can be influenced by the investors awareness to the ESG issues.

H2: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are negatively affected by the ESG issue reports in 2009 – June 2015.

Our assessment resulted CAAR of -0.8% and we have the evidence to reject H0a with the significance level of 10%, thus the evidence to reject H0a in H2 is not as strong as H1. The problem in dividing the samples into clusters is the insufficient sample size, so that we do not have enough evidences to proof that the ESG issue reports have an effect to the stock return of the listed pal oil companies in Singapore, Indonesia, and Malaysia.

H3: The stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia are positively affected by the ESG commitment reports in 2009 – June 2015.

The same case applied when we assessed the ESG commitment reports. The lack of samples resulted in the lack of evidence to reject the H0a. Therefore, we do not have enough evidence to show the effect of the ESG commitment reports to the stock return of the listed palm oil companies in Singapore, Indonesia, and Malaysia.

The lack of samples is also proven to result problems in the validity of the model. The H0c for the ESG commitment reports group, which only has 12 samples, is rejected. This shows that the validity of the assessment model relies on the number of the samples. The low number of samples can result in the violation of the assumption of normality. Another analyzed problem is the low R^2 in the market model. The low R^2 may not show the misspecification of the event study using market model, but it shows that the model is not optimal to reduce the variance of the abnormal returns.

From the sensitivity analysis, we found that our initial model is robust as it is not sensitive to the changes of both event window and estimation window. Also, both using market model and constant mean return model, we get consistent inferences whether to reject H0a or not, although some clusters have significantly different CAAR.

7.2 Discussion and recommendations

The expected outcome of the research is to show the impact of the ESG issues on the stock return of the palm oil companies. The intention is to give the idea of the exposed risk of loss to the investor's investment due to the ESG issues. Eventually, we have one evidence of the negative impact of an ESG issue, which is shown in the haze crisis in 2015. However, this haze crisis can be considered as a special event, since it also involved a natural disaster and it had a direct impact to the decreasing of production of the palm oil, thus it affected the overall palm oil industry. While for the impact of the ESG issues in a specific company, the evidence is not as strong as the haze crisis in 2015 (significant at the level of α=10%).

Conclusion and recommendations

In the recent years, the impact of integrating ESG criteria into the palm oil activities has been approached by considering the reaction of the buyers and investors who are concern about these criteria, e.g. the study published by (WWF et al., 2012). Our analysis also resulted an indication that the impact of the ESG issues on the stock return is influenced by the investors' awareness to the ESG criteria. WWF (2015) highlighted the lack of sustainable finance in Singapore, Indonesia, and Malaysia as the domestic banks and investors in the region are lagging far behind in incorporating ESG issues compared to the international financial institutions. Therefore, our result which shows relatively low evidence (significant CAAR of -0.8% at the level of α=10%) of the ESG issues impact to the palm oil investment is in line with the fact of the lack of attention in ESG issues from the investors in the Singapore, Indonesia, and Malaysia.

The insufficient samples of issues become one of the drawback of this research, especially to normality assumption violation. We could not find additional samples by expanding our search up to 2005, thus we limit our samples on 2009. One of the improvement that can be done in this research in the future is by expanding the scope to other similar industries or other regions. There is a possibility to get more samples by expanding our scope into similar plantation industries in food, fiber, and biofuel. We may also get more samples by expanding the scope into other regions outside Singapore, Indonesia, and Malaysia. Surely, the expansion of the scope must consider the variation of the result by the additional diversities that will be included in the samples.

The low R^2 also indicates that our choice to use market model do not result in the optimization of its benefit. The market model should reduce the variance of the abnormal returns if the market portfolio returns can explain a high proportion of variance in the company stock returns. Therefore, in the future study, the choice of the market portfolio as the reference in the market model should really consider the high number of R^2 so that we can optimize the benefit of using market model compared to other models.

To show the exposed financial risk of the ESG issues, firstly we have to translate the ESG criteria into financial indicators, which currently still become a challenge both for the palm oil companies and their investors. Rather than looking into historical events, another approach was done by Chain Reaction Research to present a full risk analysis of a palm oil company (Chain Reaction Research, 2015a). They created a scenario if the investors and buyers become more aware to the ESG issues and if the government become stricter to regulation regarding the ESG issues, then forecasting the impact of the scenario in the future (Chain Reaction Research, 2015a). Looking at the current trend, where more companies and financial institutions pledging to become more sustainable, this approach actually one of the better ways to give a picture of exposed risk to the palm oil investments.

Lastly, a deeper case study in each of the issues we found in this research also can help to translate the ESG issues into financial indicators. It is interesting to see how these issues affecting the financial performance by looking in detail of their financial statement, and not only into their stock return. Appendix E presents the collection of the ESG issues ranked by the worst abnormal returns, as a guidance to start analyzing deeper into each issues impact to the overall financial performance.

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Appendix A – The listed palm oil companies in Singapore, Indonesia, and Malaysia

The list is sorted based on the highest to the lowest market cap at the end of 2014.

No	Ticker	Short Name	Country where it listed[3]	Date of joining RSPO[4]	Involved in upstream?	Exposed in media during haze crisis?
1	WIL SP Equity	WILMAR INTERNATI	SG	8/15/2005	yes	yes
2	IOI MK Equity	IOI CORP BHD	MY	5/17/2004	yes	yes
3	KLK MK Equity	KUALA LUMPUR KEP	MY	10/18/2004	yes	no
4	GGR SP Equity	GOLDEN AGRI-RESO	SG	3/31/2011	yes	yes
5	AALI IJ Equity	ASTRA AGRO LEST	IND	-	yes	no
6	IJM MK Equity	IJM CORP BHD	MY	9/8/2004	yes	yes
7	HAP MK Equity	HAP SENG CONS	MY	9/1/2005	yes	no
8	FGV MK Equity	FELDA GLOBAL VEN	MY	10/17/2004	yes	no
9	FR SP Equity	FIRST RESOURCES	SG	3/10/2008	yes	yes
10	GENP MK Equity	GENTING PLANTATI	MY	11/14/2006	yes	yes
11	SMAR IJ Equity	SMART TBK	IND	1/30/2005	yes	yes
12	BAL SP Equity	BUMITAMA AGRI LT	IND	10/7/2007	yes	no
13	QLG MK Equity	QL RESOURCES BHD	MY	4/19/2007	yes	no
14	SSMS IJ Equity	SAWIT SUMBERMAS	IND	4/18/2007	yes	no
15	KUL MK Equity	KULIM MALAYSIA	MY	8/8/2004	yes	no
16	LSIP IJ Equity	PP LONDON SUMATR	IND	11/5/2004	yes	no
17	BWPT IJ Equity	EAGLE HIGH PLANT	IND	3/21/2008	yes	yes
18	SIMP IJ Equity	SALIM IVOMAS PRA	IND	9/24/2007	yes	no
19	IFAR SP Equity	INDOFOOD AGRI RE	SG	-	yes	no
20	DSNG IJ Equity	DHARMA SATYA NUS	IND	12/4/2012	yes	no
21	MKH MK Equity	MKH BHD	MY	-	yes	no
22	VSI MK Equity	VS INDUSTRY BHD	MY	-	yes	no
23	ANJT IJ Equity	AUSTINDO NUSANTA	IND	2/26/2007	yes	yes
24	TDM MK Equity	TDM BHD	MY	2/28/2011	yes	no
25	TBLA IJ Equity	TUNAS BARU LAMP	IND	7/24/2006	yes	no
26	SGRO IJ Equity	SAMPOERNA AGRO	IND	1/10/2007	yes	no
27	CBP MK Equity	CB INDUSTRIAL	MY	-	yes	no
28	YNHB MK Equity	YNH PROPERTY BHD	MY	-	yes	no
29	RSAW MK Equity	RIMBUNAN SAWIT	MY	-	yes	no
30	BMHB MK Equity	BOILERMECH	MY	-	no	no
31	SALC MK Equity	SALCON BHD	MY	-	no	no
32	JAWA IJ Equity	J.A. WATTIE TBK	IND	-	yes	no
33	DTL MK Equity	DUTALAND BHD	MY	-	yes	no

[3] SG = SINGAPORE; MY = MALAYSIA; IND = INDONESIA.

[4] Blank fill indicates that the company is not an RSPO member in the haze crisis 2015.

No	Ticker	Short Name	Country where it listed[3]	Date of joining RSPO[4]	Involved in upstream?	Exposed in media during haze crisis?
34	AM MK Equity	A & M REALTY BHD	MY	-	yes	no
35	INNO MK Equity	INNOPRISE PLANTA	MY	8/29/2014	yes	no
36	GOLL IJ Equity	GOLDEN PLANTATIO	IND	-	yes	no
37	YEE MK Equity	YEE LEE CORP	MY	-	yes	no
38	RRE MK Equity	RIVERVIEW RUBBER	MY	-	yes	no
39	OIB MK Equity	ORIENTAL INTERES	MY	-	yes	no
40	GZCO IJ Equity	GOZCO PLANTATION	IND	-	yes	no
41	ECOF MK Equity	ECOFIRST CONSOLI	MY	-	yes	no
42	JKG MK Equity	JKG LAND BHD	MY	-	yes	no
43	HARN MK Equity	HARN LEN CORP BH	MY	-	yes	no
44	SBR MK Equity	SUNGEI BAGAN RUB	MY	-	yes	no
45	UNSP IJ Equity	BAKRIE SUMATERA	IND	5/22/2007	yes	no
46	MHC MK Equity	MHC PLANTATIONS	MY	-	yes	no
47	KLR MK Equity	KLUANG RUBBER CO	MY	-	yes	no
48	GOP MK Equity	GOPENG BHD	MY	-	yes	no
49	GMUT MK Equity	GROMUTUAL BHD	MY	-	no	no
50	MPAC MK Equity	MALPAC HLDG	MY	-	yes	no
51	MAGP IJ Equity	MULTI AGRO GEMIL	IND	-	yes	no
52	AAB MK Equity	ASTRAL ASIA	MY	-	yes	no
53	CEKA IJ Equity	WILMAR CAHAYA IN	IND	-	no	yes
54	PRNB MK Equity	PREMIER NALFIN	MY	-	no	no
55	HHR MK Equity	HENG HUAT RESOUR	MY	-	no	no
56	SHL MK Equity	SIN HENG CHAN	MY	-	yes	no
57	SCP MK Equity	SCOPE INDUS BHD	MY	-	yes	no
58	PAOS MK Equity	PAOS HLDGS BHD	MY	-	no	no
59	ETWA IJ Equity	ETERINDO WAHANAT	IND	4/29/2009	yes	no
60	PSK MK Equity	PASUKHAS GROUP	MY	-	no	no
61	FG MK Equity	FARLIM GROUP	MY	-	yes	no
62	DRLM MK Equity	BINA DARULAMAN	MY	-	yes	no
63	MENT MK Equity	MENTIGA CORP	MY	-	yes	no
64	TEK MK Equity	TEKALA CORP BHD	MY	-	yes	no
65	PPB MK Equity	PINEHILL PACIFIC	MY	-	yes	no
66	SERES MK Equity	SEREMBAN ENGINEE	MY	-	no	no
67	LEWE MK Equity	LEWEKO RESOURCES	MY	-	yes	no
68	GOCB MK Equity	GREEN OCEAN CORP	MY	-	no	no
69	TGN MK Equity	TECK GUAN PERDAN	MY	-	yes	no

Appendix B – The collection of ESG issues

List of issues:

E = Environment destruction;
B = Biodiversity;
S = Social conflict;
L = Loss of customers or investors;
R = RSPO violated;
G = Governance.

No	Company	Country	Issue	Event Date	Citation
1	Astra Agro Lestari	IND	B	March 22, 2012	(Butler, 2012)
2	Astra Agro Lestari	IND	B	September 6, 2012	(Mongabay, 2012a)
3	Astra Agro Lestari	IND	B	January 9, 2014	(Butler, 2014)
4	Bumitama Agri	IND	S	November 21, 2013	(Friends of the Earth US, Walhi - Friends of the Earth Indonesia, Forest Heroes, & SumOfUs, 2013)
5	Bumitama Agri	IND	L	May 26, 2014	(Friends of the Eart Europe, 2014)
6	Bumitama Agri	IND	E	September 12, 2014	(Bell, 2014)
7	First Resources	SG	E	December 20, 2012	(Mongabay, 2012b)
8	Genting Plantation	MY	R	April 30, 2014	(The Edge, 2014)
9	Sinar Mas (GAR)	SG	L	December 11, 2009	(Greenpeace, 2009)
10	Sinar Mas (GAR)	SG	B	March 15, 2010	(Greenpeace, 2010a)
11	Sinar Mas (GAR)	SG	E	July 6, 2010	(Greenpeace, 2010b)
12	Sinar Mas (GAR)	SG	G	August 19, 2010	(Greenpeace, 2010c)
13	Sinar Mas (GAR)	SG	L	September 2, 2010	(Greenpeace, 2010e)
14	Sinar Mas (GAR)	SG	R	September 23, 2010	(Greenpeace, 2010d)
15	Golden Agri Resources	SG	E	June 19, 2013	(Cheam, 2013)
16	Golden Agri Resources	SG	R	April 8, 2015	(Forest Peoples Programme, 2015)
17	IOI Corporation	MY	S	March 15, 2010	(Milieudefensie & Friends of the Earth Europe, 2010)
18	IOI Corporation	MY	S	April 6, 2011	(Mongabay, 2011)
19	Kuala Lumpur Kepong	MY	S	April 3, 2014	(Mongabay, 2014)
20	Kuala Lumpur Kepong	MY	R	November 16, 2014	(Saturi, 2014)
21	Sinar Mas (SMART)	IND	L	December 11, 2009	(Greenpeace, 2009)
22	Sinar Mas (SMART)	IND	B	March 15, 2010	(Greenpeace, 2010a)
23	Sinar Mas (SMART)	IND	E	July 6, 2010	(Greenpeace, 2010b)
24	Sinar Mas (SMART)	IND	G	August 19, 2010	(Greenpeace, 2010c)
25	Sinar Mas (SMART)	IND	L	September 2, 2010	(Greenpeace, 2010e)
26	Sinar Mas (SMART)	IND	R	September 23, 2010	(Greenpeace, 2010d)

No	Company	Country	Issue	Event Date	Citation
27	Sawit Sumbermas	IND	E	June 4, 2015	(Greenomics Indonesia, 2015)
28	Bakrie Sumatra Plantation	IND	S	September 10, 2009	(Klute, 2009)
29	Wilmar	SG	E	June 24, 2013	(Mongabay, 2013)
30	Wilmar	SG	E	June 26, 2013	(WWF, 2013)
31	Wilmar	SG	B	October 20, 2013	(Greenpeace, 2013)
32	Wilmar	SG	E	June 11, 2014	(Greenomics Indonesia, 2014)
33	Wilmar Cahaya Indonesia	IND	E	June 24, 2013	(Mongabay, 2013)
34	Wilmar Cahaya Indonesia	IND	E	June 26, 2013	(WWF, 2013)
35	Wilmar Cahaya Indonesia	IND	B	October 20, 2013	(Greenpeace, 2013)
36	Wilmar Cahaya Indonesia	IND	E	June 11, 2014	(Greenomics Indonesia, 2014)

Appendix C – The collection of ESG commitments

No	Companies	Country	Event Date	Citation
1	Dharma Satya Nusantara	IND	December 4, 2012	(RSPO, n.d.-c)
2	Eterindo Wahanatama	IND	April 29, 2009	(RSPO, n.d.-d)
3	Golden Agri-Resources	SG	February 9, 2011	(Butler, 2011)
4	Golden Agri-Resources	SG	March 31, 2011	(RSPO, n.d.-a)
5	Golden Agri-Resources	SG	March 19, 2013	(Parker, 2013)
6	Golden Agri-Resources	SG	March 3, 2014	(Greenpeace, 2014)
7	Innoprise Plantation Berhad	MY	August 29, 2014	(RSPO, n.d.-b)
8	IOI Corp	MY	February 3, 2015	(Mongabay, 2015)
9	Kuala Lumpur Kepong	MY	September 9, 2014	(Sime Darby, 2014)
10	SMART	IND	February 4, 2010	(WWF, 2010)
11	TDM Berhad	MY	February 28, 2011	(RSPO, n.d.-e)
12	Wilmar Cahaya Indonesia	IND	December 5, 2013	(Wilmar, 2013)
13	Wilmar International	SG	December 5, 2013	(Wilmar, 2013)

Appendix D – Top Fund Holdings in Market Indices

Top fund holdings in MXSG Index

Top Fund Holdings

NAME	POSITION	VALUE	% OF FUND
SINGAPORE TELECOMMUNICATIONS L	26.99 M	66.72 M	13.90
DBS GROUP HOLDINGS LTD	5.93 M	60.32 M	12.57
OVERSEA-CHINESE BANKING CORP L	10.15 M	56.05 M	11.68
UNITED OVERSEAS BANK LTD	4.35 M	53.18 M	11.08
CAPITALAND LTD	8.96 M	19.10 M	3.98
KEPPEL CORP LTD	5.13 M	17.24 M	3.59
COMFORTDELGRO CORP LTD	7.51 M	15.02 M	3.13
SINGAPORE AIRLINES LTD	1.92 M	14.69 M	3.06
GLOBAL LOGISTIC PROPERTIES LTD	10.98 M	14.68 M	3.06
SINGAPORE PRESS HOLDINGS LTD	5.77 M	14.26 M	2.97

Reference: http://www.bloomberg.com/quote/EWS:US. Accessed on 1/19/2016.

Top fund holdings in MXID Index

Top Fund Holdings

NAME	POSITION	VALUE	% OF FUND
BANK CENTRAL ASIA TBK PT	31.04 M	29.04 M	11.65
TELEKOMUNIKASI INDONESIA PERSE	126.89 M	28.17 M	11.30
BANK RAKYAT INDONESIA PERSERO	27.96 M	23.04 M	9.24
ASTRA INTERNATIONAL TBK PT	50.97 M	22.01 M	8.83
BANK MANDIRI PERSERO TBK PT	23.49 M	15.68 M	6.29
UNILEVER INDONESIA TBK PT	3.84 M	9.96 M	3.99
MATAHARI DEPARTMENT STORE TBK	5.88 M	7.35 M	2.95
BANK NEGARA INDONESIA PERSERO	18.78 M	6.72 M	2.70
HANJAYA MANDALA SAMPOERNA TBK	938.00 K	6.50 M	2.61
SEMEN INDONESIA PERSERO TBK PT	7.47 M	5.70 M	2.29

Reference: http://www.bloomberg.com/quote/EIDO:US. Accessed on 1/19/2016.

Top fund holdings in MXMY Index

Top Fund Holdings

NAME	POSITION	VALUE	% OF FUND
PUBLIC BANK BHD	4.96 M	20.60 M	10.33
MALAYAN BANKING BHD	9.70 M	18.33 M	9.19
TENAGA NASIONAL BHD	6.11 M	18.15 M	9.10
SIME DARBY BHD	6.37 M	10.31 M	5.17
CIMB GROUP HOLDINGS BHD	10.02 M	9.13 M	4.58
GENTING BHD	4.67 M	7.66 M	3.84
PETRONAS CHEMICALS GROUP BHD	4.70 M	7.48 M	3.75
DIGI.COM BHD	6.17 M	7.25 M	3.64
PETRONAS GAS BHD	1.46 M	7.14 M	3.58
IOI CORP BHD	6.39 M	6.27 M	3.14

Reference: http://www.bloomberg.com/quote/EWM:US. Accessed on 1/19/2016.

Appendix E – The collection of ESG Issues ranked by the CAR (top 10)

The table below presents the results of initial assessment for H2, thus the event window is 2 days and the estimation window is 250 days.

No.	Company	Country	Issue	Event Date	CAR	Citation
1	Astra Agro Lestari	IND	B	January 9, 2014	-0.066	(Butler, 2014)
2	Sinar Mas	IND	L	September 2, 2010	-0.043	(Greenpeace, 2010e)
3	Wilmar	SG	E	June 24, 2013	-0.040	(Mongabay, 2013)
4	Sinar Mas	SG	G	August 19, 2010	-0.037	(Greenpeace, 2010c)
5	Golden Agri Resources	SG	E	June 19, 2013	-0.034	(Cheam, 2013)
6	Sinar Mas	IND	L	December 11, 2009	-0.034	(Greenpeace, 2009)
7	IOI Corporation	MY	S	March 15, 2010	-0.027	(Greenpeace, 2010a)
8	Sinar Mas	IND	R	September 23, 2010	-0.027	(Greenpeace, 2010d)
9	Kuala Lumpur Kepong	MY	S	April 3, 2014	-0.017	(Mongabay, 2014)
10	Sawit Sumbermas	IND	E	June 4, 2015	-0.016	(Greenomics Indonesia, 2015)