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Green policy effect on firm sustainability: examining the stock performance of ESG adopters in heavy-polluter industry in Malaysia

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ABSTRACT

This study aims to investigate the effect of the green policy announcement on heavy-polluter stock returns in Malaysian industries. The study adopted a market-model event study methodology to measure 251 heavy-polluter companies from October 9, 2009 to October 29, 2021. Based on the findings, the first objective (to accept *H1*) showed that investors in Malaysia demonstrated mixed reactions (+ve and –ve) towards the green policy announcement whereas the second objective (to accept *H2*) revealed that there is an effect (+ve and –ve) for ESG adopters in three industries namely chemical and construction, metal and mining, and travel and leisure towards the green policy announcement. From a practical standpoint, there are several implications to consider. Firstly, investors, portfolio managers, and regulators can utilize stock returns as a means to maximize shareholders' wealth. Secondly, the incorporation of ESG practices in the selection of companies can serve as a performance indicator for investment decisions. Thirdly, government entities can benefit from the ratification of green policies as an effective approach towards maximizing shareholders' value. A theoretical perspective, an efficient market, investors cannot generate abnormal profits once the announcement is made. Failure to incorporate information related to environmental events into share prices would be inconsistent with the efficient market hypothesis. Finally, from a management or company standpoint, investing in green initiatives allows heavy-polluter companies to transition into more energy-efficient and environmentally-friendly entities, fulfilling their social, environmental, and ESG responsibilities. This study's novelty focuses on the relationship between stock performance, green finance policies, and ESG adoption.

IMPACT STATEMENT

Green finance policies encompass a range of regulatory measures, incentives, and initiatives aimed at mobilizing financial resources towards environmentally sustainable investments and projects. These policies are designed to address pressing environmental challenges, such as climate change, biodiversity loss, pollution, and resource depletion, by redirecting capital flows towards activities that promote sustainable development and mitigate environmental risks. ESG, on the other hand, encompasses a broader set of criteria used by investors to evaluate a company's performance and sustainability practices across environmental, social, and governance dimensions. The study adopted a market-model event study methodology to measure 251 heavy-polluter companies from October 9, 2009 to October 29, 2021. On top of that, the study highlights the finding on the effect on green policy announcement. The finding shows that investors in Malaysia demonstrated mixed reactions (+ve and −ve) towards the green policy announcement and there is an effect (+ve and −ve) for ESG adopters in three industries namely chemical and construction, metal and mining, and travel and leisure towards the green policy announcement. This research has significant implication for investors, government, financial institutions, regulators and other stakeholder and academician in Malaysia.

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1. Introduction

Malaysia is one of the highest emitters of energy-related carbon dioxide (CO_2) among South-East Asian countries, with the biggest economic contribution coming from the energy sector. Fossil fuels demand is expected to increase by more than three-folds by 2040 as stated by Abdul Manaf and Abbas (2019). According to Our World in Data report, the total CO_2 emission (million, tonnes) by sector from year 2000 to 2016 showed that electricity and heat produce the highest CO_2 emission at 1525.7 million tonnes, followed by transportation (62.8 million tonnes) and manufacturing & construction (29.6 million, tonnes) (Khan et al., 2022). Due to the increasing year-to-year CO_2 emission, Malaysia has pledged to reduce its GHG emissions intensity of gross domestic product (GDP) by 45% by 2030 relative to the emissions intensity of GDP in 2005 from green technology financing introduced by the Green Technology Master Plan Malaysia 2017-2030 (2017). This is the first systematic framework and planning to accelerate or promote a green growth route to national sustainability in Malaysia and to support the Malaysian Green Government Procurement (GGP) (KeTTHA, 2017). This effort has been done to ensure alignment with the 17 Sustainable Development Goals (SDGs) encompassing the economic, social and environmental spheres (Rehman Khan et al., 2022).

A green company is defined as a business that prioritizes energy conservation, emissions reduction, and environmental protection (D'Angelo et al., 2022; Saha & Darnton, 2005). Such companies actively adopt energy-saving technologies and practices to minimize their carbon footprint and contribute to a sustainable future (Lyon et al., 2013). Furthermore, green companies may engage in transactions with low-pollution, low-energy-consuming industries to promote environmentally-friendly practices and policies (Albino et al., 2009). By incorporating ESG (Environmental, Social, and Governance) factors, particularly the environmental pillar score, investors and stakeholders can gain insights into a company's commitment to sustainability and its environmental impact. This information helps investors make informed decisions regarding resource allocation to companies that align with their sustainability goals and values. Since 2016, the sustainability framework has effectively replaced the previous Corporate Social Responsibility (CSR) framework (Bursa Malaysia, 2024). Under this current framework, companies are required to disclose relevant information and provide details about their implementation of ESG criteria in their annual reports and on their company websites. The purpose of this disclosure is to enhance the company's reputation in the eyes of stakeholders (MCCG, 2018). We discovered several studies that explored the impact of greener environmental policies. While our study differs in certain aspects, it shares similarities with the work conducted by Ramiah et al. (2013), which examined the influence of 19 green environmental policy announcements on the stock return performance of Australian firms. The study analyzed the market's reaction to these policy announcements and determined whether they had a significant effect on the stock returns of the companies involved.

Additionally, Guo et al. (2020) investigated the effects of 10 environmental policies on heavily polluting stocks in the Chinese stock market. Their study focused on examining the impact of these policies specifically on stocks associated with high levels of pollution. They analysed the stock market performance of companies in the heavily polluting sector in response to environmental policies. However, both the aforementioned studies did not specifically consider environmental score companies as the sample data.

Meanwhile, a limited number of studies in Malaysian had considered market reaction associated with stock price performance on green finance policies and ESG adopters. Jaafar et al. (2003) examined the intricacy of energy policies, issues and challenges woven into the development of the energy sector; Ch'ng et al. (2020) investigated the influence of ecologically-friendly innovation on the technology sector; Pui and Othman (2019) examined the driving factors behind the increase in CO_2 emissions in Malaysia with special focus on the manufacturing, electricity and transportation sectors; Abdul Manaf and Abbas (2019) analysed economic and environmental sustainability (via techno-economic analysis) of CO_2 mitigation technology, while Meng, Nee and Ismail (2019) investigated the relationship between green accounting and the financial performance of Malaysian Plantation companies. Hence, the objective of this current study is to address this research gap by specifically examining the stock price performance with green finance policies and ESG adopters. This particular focus on the relationship between stock performance and green finance policies, along with ESG adoption, contributes a distinct perspective to the current body of literature, particularly within the Malaysian context.

Overall, the study's novelty lies in its exploration of how Malaysia's serious approach towards environmental concerns and the implementation of green policies have influenced the transition towards a greener economy. By examining the stock performance of ESG-adopting companies, the researchers can assess the outcomes of these policies in terms of sustainability and financial performance. This study's findings may have implications for policymakers, industry stakeholders, and investors by providing evidence of the effectiveness of green policies and their impact on the heavy-polluter industry's sustainability. It may also contribute to the ongoing evaluation and improvement of green policies in Malaysia and serve as a reference for other countries or industries aiming to promote sustainability, green economy and renewable energy adoption through 11-green policy announcements made between 2009 and 2020.

The remainder of this paper is organized as follows. Following this introduction in Section 1, Section 2 presents the related theory and literature review. Section 3 describes the data and sample of the selection process, as well as the methodologies used to measure the market's reaction. The results are presented in Section 4, while Section 5 and Section 6 discuss and conclude the paper, respectively.

2. Literature review

2.1. Market efficiency

A market is efficient if the security prices fully reflect new information arrival and the available information (Fama, 1970; Ramiah et al., 2013). On an announcement of green policies on heavy-polluter industries, the investor's share prices would vary considerably to reflect the investors' beliefs on the attractiveness of the green policy activities. In the short-run, the prices would fluctuate depending on the promising firm's environmental performance. However, over the long-run, such as a duration of a three-year period, there should not be any overreaction or underreaction if the market is efficient since information regarding the market valuation of environmental event is accessible to investors (Klassen & McLaughlin, 1996).

2.2. Green policies in the Malaysian framework

In the context of Malaysia, several frameworks had been introduced by Malaysia such as the Economic Transformation Programme (ETP), the Government Transformation Programme (GTP), and the 10th Malaysian Plan (10MP) in order to promote sustainable development. Later, the Sustainable Consumption and Production (SCP) patterns were introduced. The project 'Implementing the National Sustainable Consumption and Production Blueprint through Government Green Procurement (SCP-GGP)' consultations which took place over a span of four years (2012–2016) was materialised in the National SCP Policy Framework in the form of a SCP Blueprint and input to the 11th Malaysia Plan (11MP; 2016–2020). It is intended to guide the country towards achieving long-term sustainability in terms of industrial practices and consumer behaviour such as government green procurement (GGP). GGP refers to the procurement of supplies, services, and works by the public sector while taking into consideration the environmental criteria so as to conserve and minimize any environmental impacts, accelerate the national economy, and promote sustainable development (KeTTHA, 2013). Furthermore, the commitment of the Malaysian government in promoting green initiatives is also highlighted in the National Green Technology Policy (NGTP) which was set up to support industries, manufacturers and suppliers offering green product or services into becoming more environmentally-friendly and competitive in the local and global markets. Five strategic thrusts were introduced with the aim to (1) strengthen the institutional framework, (2) provide a conductive environment for green technology development, (3) intensify human capital development in green technology, and (4) intensify green technology research and innovations as well as promotion and public awareness. Finally, the necessity of a green economic transformation is reflected in the federal budget in which RM1.5 billion was provided between 2010 and 2012 to encourage green technology projects through the Green Technology Financing Scheme (GTFS). The amount was increased to 2 billion for the period of 2013 to 2015.

As part of its commitment in investing in green economy, Malaysia, like many other countries, has significantly accelerated its efforts to promote renewable energy resources, with incentives provided over the years reflecting the government's effort to develop and support the sector. Thus, the government has issued several significant policy announcements aimed at stimulating the green sector since 1994

Table 1. Announcement of green policies in Malaysia.

Date	Description
9 October 2009	Malaysia launches national green technology policy. Policy statement: green technologies shall be a driver to accelerate the national economy and promote sustainable development.
4 January 2010	First Green Technology Financing Scheme (GTFS)- had announced to provide on 60% financing amount to benefit 140 companies including heavy-polluter industry. (https://www.iea.org/policies/4904-green-technology-financing-scheme-gtfs).
2 April 2010	Government approved The National Renewable Energy (RE) policy and Action plan (NREPAP). The policy vision is to enhance the utilization of indigenous renewable energy (RE) resources to contribute towards national electricity supply security and sustainable socioeconomic development.
3 January 2011	The Federal Government introduced the 'No Plastic Bag Day' campaign every Saturday.
23 October 2012	Green Investment Tax allowance
11 July 2013	Government Green Procurement (GGP). The action plan has been endorsed on the 11th of July 2013 by the GGP Steering Committee (SC) chaired by the Ministry of Finance (MOF) and the Ministry of Energy, Green Technology and Water (KeTTHA).
12 April 2016	Signed the Paris agreement. https://mpoc.org.my/the-paris-agreement-and-the-role-of-the-malaysian-palm-oil-industry/
27 July 2017	Securities Commission Malaysia (SC) announced the issuance of Malaysia's first green Sukuk.
3 May 2018	The GTFS 2.0 Scheme was later launched in Kudat, Sabah. However, after the 14th General Election in May 2018, the new Government administration had decided to discontinue the Scheme.
6 November 2020	Government had announced the extension the period of the Green Technology Financing Scheme (GTFS 2.0 to GTFS 3.0) until 2022.
29 October 2021	Announcement of National Budget 2022. Malaysia has expressed commitment to make Malaysia a carbon neutral country as early as 2050 through the potential of electric vehicles (or EVs) with Energy Efficient Vehicle (or EEV).

including Small Renewable Energy Power, the launch of the Green Building Index, GTS-Government guarantee of financing amount, and others (refer to Table 1). It is interesting to observe whether the announcement could create value for the firms and their respective investors. In accordance with the New Economic Model (NEM), Malaysia holds a basic premise to foster innovation and promote investment in low-carbon production technologies, specifically in areas like renewable energy and the green economy.

2.3. Empirical evidence of the effect of the green policy announcement on stock returns

White (1996) investigated how shareholders responded to the signing of the Coalition for Environmentally-Responsible Economies (CERES) and the relationship between shareholder value and a firm's reputation for environmentally-responsible behaviour. The author used 97 companies listed on the New York Stock Exchange (NYSE) or American Stock Exchange (AMEX) from 1989 to 1992, and 56 signatories in June 1995 listed on the NYSE, AMEX or securities dealer automated quotation system (NASDAQ) (e.g. firms adopting the CERES Principles to reduce waste and conserve energy in general work towards improving the environment). They found that investors who bought common stocks of firms rated 'green' earn significant positive returns at a 5% level. The result indicates that shareholders have confidence and support green companies. Meanwhile, shareholders showed significant and positive abnormal return of the day (0) upon signing the CERES Principles (1.05%, p-5%). It was argued that the shareholders perceive it as good news when the firms pledge themselves to pursue the responsible corporate behaviours outlined in the CERES Principles.

Klassen and McLaughlin (1996) investigated the market reaction towards two types of environmental performance announcements. The first one entailed positive events (e.g. award to be reported by the international news media) which confirmed strong environmental performance in organizations and signalled this fact to the public. The authors examined 96 publicly-traded firms including 14 of the 20 manufacturing sectors (SIC codes), electrical utilities, and oil and gas extraction firms from 1985 to 1991. They found that the market perceived positive cumulative abnormal returns of 0.63% (*P*–0.01) for a three-day window (–1,1) on the positive events environmental award. This result indicates that the market investor rewarded firms which received awards for investing in areas such as new or redesigned products and processes, minimized their adverse environmental impact, and improved their environmental safety systems.

Wang et al. (2020) evaluated the impact of green bond issuance on shareholders' wealth. They examined 159 green corporate bonds from January 2016 to June 2019 consisting of corporate bonds, enterprise bonds, financial bonds, asset-backed securities and government-related bond. Their findings indicated that there is a significantly greater positive abnormal stock return for green bonds compared to conventional bonds. The result was 0.5% (0.1%) and 1.2% (0.1%) statistically significant at a minimum of 1% for a 7-day

(–3, 3) and 21-day (–10, 10) window, respectively. The authors argued that green bonds add value to shareholders. The Stakeholder Value Maximizing perspective asserts that committing to environmentally-friendly projects through green bond issuance enhances firm value from the perception of shareholders.

Tang and Zhang (2020) investigated the announcement returns and real effects of international green bonds with labelled Climate Bond Initiative (CBI) issuance by firms in 28 countries for the years between 2007 and 2017. The green bond consists of the Green Use of Proceed Bond, the Green Use of Proceeds Revenue Bond, the Green Project Bond, and the Green Securitized Bond. The authors found that 1510 green bonds from China, the US and European countries showed significant and positive returns of 1.39% and 1.04% for a 21-day event window and 16-day event window at a minimum level of 5%. They argued that the positive stock market reaction represents the 'green label' effect, indicating that the firm's green projects are certified to have an environmental impact. Thus, the market will reward the company with a higher firm value.

Ramiah et al. (2013) investigated the impact of 19 green policy announcements of environmental regulation on the 35 sectors listed on the Australian Stock Exchange over the period of 2005 to 2011. They found that oil and gas, real estate, and the general industrial sectors experienced significant negative abnormal returns of –2.84%, –2.12, and –1.86 at a minimum level of 5% and adversely affected by the announcement of 'the Australian government's green paper is released, outlining intended emission trading design – the Carbon Pollution Reduction Scheme (CPRS)'. The authors argued that the primary objective of the CPRS is to raise the costs of production of top polluters, forcing them to find and adopt alternative modes of production that are environmentally-friendly. The alternative energy sector recorded the highest negative cumulative abnormal return of 31.81% for a five-day (–2,2) event window right after the Australian government submitted its target carbon reduction range to the Copenhagen accord on 27 January 2010. They claimed that Australia decided not to commit beyond a 5% reduction on the 2000 levels unless other global emitters (such as the US, China and India) are clear about their share of the deal. Meanwhile, several sectors reacted positively to the announcement such as the industrial engineering sector which showed a positive abnormal return of 4.19% to the announcement of 'the Senate rejects the Carbon Pollution Reduction Scheme bill' as this scheme was not environmentally-friendly.

Guo et al. (2020) investigated the China investor market's reaction to heavy polluting stocks after the announcement of environmental policies from 2014 to 2017. They found that the average abnormal return is negatively significant to more new stringent environmental regulation of –0.544% during the two-day event window (CAR 0,2). The authors claimed that when the government released new stringent regulations, the potential profitability of heavy polluting industries (building materials, petrochemical, papermaking, leather and textile) had likely decreased, which further induced the stock prices to decrease. However, these studies had focused on developed countries which implement stricter low-carbon environmental enforcement. Thus, investors can predict that the reaction of market stock performance event for heavy-polluter industries would either be low, average, or high during the environmental policies announcements. Other than that, these countries also impose carbon tax which demonstrates the respective governments' serious attention towards achieving a low-carbon environment.

Xu et al. (2012) explored the stock market's reaction to information disclosure of Environmental Violation Events (EVEs) for Chinese listed companies. The authors defined EVEs to include gas leaks, explosions, chemical and oil spills, radioactive release, explosions in chemical plants, and so on. By using the environmental violation data of 57 firms, they found that the market reacted negatively towards river pollution (–0.156) at a minimum significance level of 10% for 20-day and 30-day CARs. They argued that the pollution information had probably leaked in advance and alleviated the market's response.

Jiang and Luo (2018) investigated the Chinese market's reaction to environmental-policy-related announcements from the Chinese government in response to the delayed environmental/carbon regulation in China. The authors indicated two reasons for the delay in the implementation. Firstly, China had insisted on the fairness principle of the Kyoto Protocol as well as the principle of Common, but with differentiated responsibilities. Secondly, since China is a developing country, development is still its priority. The authors used several announcements made by the Chinese government concerning the Copenhagen Climate Summit covering the period from May 2009 to November 2011 (245 Chinese companies). They found that market reactions to the carbon policies were significantly positive with CARs of 0.17% to 0.70%, suggesting that investors perceive the delay of mandatory carbon regulations in China following the Copenhagen Climate Summit to outweigh their costs and hence good news.

H_1: There is either a positive or negative reaction to the green policy announcement on the stock return of heavy-polluter industries.

2.4. Empirical evidence of the effect of green policy announcement for environmental score companies on shareholders' value

Hamilton (1995) examined the impact of the Toxic Release Inventory (TRI) data on two types of companies namely those involved in Superfund sites (often generate publicity because of litigation, regulatory actions, and community responses to potential contamination), and firms with media coverage in which air pollution, land release, or disposal facilities attract the attention of journalists. The author found that companies of which TRI emissions received media coverage and listed as potentially responsible parties at Superfund sites in 1989 experienced negative average abnormal returns of –0.00348% (p–0.05) and –0.00373 (p–0.01). In terms of the dollar values of the abnormal returns, firms that eventually enjoyed media coverage of their releases experienced AAR of –$6.2 million on day (0) whilst firms with Superfund sites had AAR of –$5.9 million on day (0). It is claimed that the greater the number of different chemical submissions reported by the firms, the larger the drop in stock value for the company.

Levi and Newton (2016) analysed short-run returns of Newsweek's Green Rankings for the years 2009 and 2010. Newsweek's Green Rankings rank the top US 500 green score (GS), environmental impact (EI) score, GPs and reputation survey (RS). By using the 48 Fama-French industry classifications, the final sample of 4652 showed that there is a significant and positive relation between most Newsweek green scores of 0.73% (GS), 0.30% (GP) and .0.37% (EI) surrounding a 32-day (0, +30) event window. The authors claimed that green stock outperforms brown stock, which indicates that investors find green stock quite feasible and thus favour its inclusion into their portfolio without any obvious adverse effects on their portfolio performance. In addition, the green stock is inexpensive.

Green stock is a share of a company that engages in business activities with the aim to reduce their ecological impact; brown stock is otherwise. Robinson et al. (2018) evaluated the potential impact of news on the returns of the top 10 green companies in emerging markets such as China, Taiwan, Brazil, South Africa and India. News such as those on terrorism, natural disasters, elections, quarterly financial reports, changes in financial reporting standards, or a misconstrued celebrity tweet are always followed by a commensurate reaction in the capital markets. The authors used data from the top ten green companies in emerging markets from 2010 to 2015. The green companies include Financial, Telecommunication, Technology and Consumer Services. They found that China Overseas Land & Investment Ltd (China) and Banco Bradesco Prf (Brazil), which are in the financial industry, experienced positive returns of 0.009 and 0.003 for a two-day event (CAR 0,1) and statistically significant at a 5% level. The result indicates that greening makes firms less susceptible to the impact of short-run periods. In addition, companies in the financial industry tend to have just recently adopted green practices or are supporting green firms.

Laborda and Sánchez-Guerra (2021) examined the effect of green bonds on the share price of ESG companies. According to the authors, green bond is used to finance green projects in the fields of renewable energy, reduction of greenhouse gas emission, and so on. They found that green bond has a positive reaction in the stock market in the three-day event window with 0.28% cumulative abnormal return (CAR). The result shows that institutional investors favour investing in environmentally-sustainable projects and simultaneously encourage the development of activities that produce benefits for the society and the economy.

H_2: There is either a positive or negative return of the green policy announcement for ESG adopters in heavy-polluter industries on shareholders' value.

3. Methodology

3.1. Data

Daily data is obtained from DataStream, and Bloomberg on the sample of data which consists of 251 public-listed companies stock prices over the period October 9, 2009 to October 29, 2021. The DataStream classification standards are utilized to construct industry portfolios in which there are 11 heavy polluter industries[1] or sectors. ESGc, ESGe, ESGs, ESGg Combined scores and individual scores of ESG scores (sources: Refinitiv ESG)[2]

Table 2. Sampled firms by industry.

Industry	No. of firms
Automobile and parts	9
Chemical and construction	52
Electricity and equity	3
Food producer	70
Gas, water and multi-utilities	8
Metal and mining	33
Transport	24
Oil and gas producer	2
Personal goods	19
Pharmaceutical and bio	7
Travel and Leisure	24
Total	251

3.2. Sample selection

In this study, three important characteristics are identified to be significant; First definition/description of the event, second identification of the event announcement date and finally identification of the firm involved as in the Table 2 show the sampled firms by industry.

Table 1 reports 11 announcements of green policies. All these announcements are derived from the report disclosed by the Ministry of Energy, Green Technology and Water Malaysia as well as media covering newspaper, television and internet.

3.3. The empirical model

This research employs the quantitative methodology. It uses event study methodologies as suggested by previous research (Bradley et al., 1983; Brown & Warner, 1985; Ishak et al., 2020a, 2020b, 2022; MacKinlay, 1997). The market model is used to measure abnormal market reactions to green policy announcements. Specific types of announcements examined in this study had covered the study period such as the announcement on Small Renewable Energy Power, the launch of Green Building Index, and Green Technology Financing Scheme (GTFS-Government) guarantee of financing amount.

In order to capture the impact of market reactions on green policy announcements, this study uses a 121-day event window comprising 60 pre-event days, the event day (0), and 60 post-event days.[3] The estimation period is from day −200 to −61 days before the announcement date. As suggested by MacKinlay (1997), a larger event window is used rather than a specific period of interest to enable the researcher to capture market reactions before the official date of the announcement. In order to measure the cumulative abnormal return (CAR), the normal return is first calculated using the market model approach as suggested by MacKinlay (1997). The normal return refers to the expected return if the event did not happen. The FTSE Bursa Malaysia EMAS Index (FBMEMAS) is used as the market portfolio as it is a broader index compared to the more popular FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBMKLCI). The daily raw returns of company i on day t is computed as follows:

$$R_{i,t} = L_n\left(\frac{p_{i,t}}{p_{i,t-1}}\right) \tag{3.1}$$

$R_{i,t}$ = Return on company i during on day t

$p_{i,t}$ = Price of company i shares at the end of day t

$p_{i,t-1}$ = Price of company i shares at the end of day $t-1$.

The daily raw return of FBMEMAS market index on day t is.

$$R_{m,t=}L_n\left(\frac{EMAS_t}{EMAS_{t-1}}\right) \tag{3.2}$$

$R_{m,t}$ = Return on market index during on day t

$EMAS_t$ = Market index level at the end of day t

$EMAS_{t-1}$ = Market index level at the end of day $t-1$

Next, the return dates from day −200 to day −61 are used to estimate intercept and slope of market model in the following form:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \tag{3.3}$$

$R_{i,t}$= The return of company i during on day t
α_i *and* β_i = The parameters of market model
$R_{m,t}$ = Market return on day t
$\varepsilon_{i,t}$ = The zero mean distribution term

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) + \varepsilon_{i,t} \tag{3.4}$$

$AR_{i,t}$ = The abnormal return of company i on day t (3.4)

And the rest of the parameters are explained previously. The next step is to take the daily average abnormal return AAR_t of all companies as follows:

$$AAR_t \quad \frac{\sum_{i=1}^{n} AR_{i,t}}{n_t} \tag{3.5}$$

Where n_t is the number of companies traded on day t. The variance of $AR_{i,t}$ using market model is:

$$Var_{AAR_t} \quad \frac{1}{n^2} \quad \sum_{i=1}^{n} \quad \sigma_{\varepsilon i}^2 \tag{3.6}$$

Where $\sigma_{\varepsilon i}^2$ is variance of the residuals of company i that is estimated from model 3.3. To test for daily significance of AR_t, Z-test is used where:

$$z = \frac{AAR_t}{\sqrt{var_{(AAR_{t1,t2})}}} \tag{3.7}$$

Next, the cumulative average abnormal return $CAAR_{t1,t2}$ would be calculated for the window period between $t1$ and $t2$ as follows:

$$CAAR_{t1,t2} = \sum_{t=t1}^{t2} AAR_t \tag{3.8}$$

To test for significant of $CAAR_{t1,t2}$, Z-test is used where:

$$z = \frac{CAAR_{(t1,t2)}}{Var_{(CAAR_{t1,t2})^{1/2}}} \tag{3.9}$$

The cumulative abnormal returns of companies i (CAR (t1, t2) over specified period t1 to t2 is calculated by summing daily abnormal returns of companies i across the period as follows:

$$CAR_{t1,t2} = \sum_{t=t1}^{t2} \quad AR_{i,t} \tag{3.10}$$

4. Result: Average abnormal returns (AAR) for industry groups for event-day (0)

Table 3 reports the average abnormal returns (AAR) observed for all 11 heavy-polluter industries in Malaysia for event day (0) for 11 green announcements implementation between 2009 and 2021. On 4 January 2010, which was the first Green Technology Financing Scheme (GTFS) implemented by government, five out 11 industries showed positive and negative reactions during the announcement. Those industries are chemical and construction (2.05%), food producer (0.68%), oil and gas producer (0.41%), pharmaceutical and bio (–0.66%), and travel and leisure (1.33%). Furthermore, several industries showed an opposite reaction during the announcement for the extension of GTFS 2.0 to GTFS 3.0 until 2022 (6 November 2020), with a fund size of 2 billion guaranteed by Danajamin to encourage the issuance of SRI sukuk. Those industries are chemical and construction (1.69%), food producer (1.42%), and transport (2.29%).

Moreover, two industries showed mixed reactions during the announcement of the 'No Plastic Bag Day' campaign for every weekend (3 January 2011). The objective of the campaign is to support the

Table 3. Average Abnormal Return (AARs) for Industry Groups for event-day (0) periods.

Industry/AAR	9/10/2009	4/1/2010	2/4/2010	3/1/2011	23/10/2012	11/7/2013	12/4/2016	27/7/2017	3/5/2018	6/11/2020	29/10/2021
Automobile and parts	−0.0062	0.0057	−0.0008	0.0330	0.0074	0.0103	**−0.0123**	−0.0164	0.0029	0.0026	**0.0220**
	0.6041	0.5267	0.9277	0.1372	0.5205	0.3298	**0.0595***	0.1163	0.4636	0.8678	**0.0541****
Chemical and construction	**−0.0095**	**0.0205**	−0.0079	0.0043	−0.0031	−0.0028	0.0048	0.0002	−0.0042	**−0.0169**	0.0049
	0.0025***	**0.0922***	0.3352	0.3836	0.2818	0.5548	0.1408	0.9408	0.2199	**0.0037*****	0.2044
Electricity and equity	**−0.0029**	0.0328	−0.0134	0.0030	0.0048	0.0008	−0.0069	−0.0037	0.0189	−0.0236	0.0260
	0.0734*	0.3720	0.3492	0.7208	0.4703	0.9600	0.3097	0.2814	0.2349	0.3879	0.3992
Food producer	−0.0016	**0.0068**	−0.0015	**0.0110**	−0.0045	0.0025	−0.0018	**−0.0037**	0.0037	**−0.0142**	0.0045
	0.4775	**0.0524****	0.7666	**0.0269****	0.1712	0.3046	0.5095	**0.0305****	0.1080	**0.0000*****	0.1046
Gas, water, and multi-utilities	−0.0016	−0.0019	−0.0024	0.0071	−0.0027	−0.0058	0.0088	−0.0007	−0.0018	−0.0094	0.0030
	0.8935	0.9091	0.5192	0.1974	0.2089	0.4100	0.1835	0.8373	0.6826	0.3935	0.4939
Industry metal and mining	−0.0002	0.0045	0.0038	0.0044	−0.0038	0.0057	**0.0172**	0.0038	−0.0021	−0.0098	**0.0074**
	0.9648	0.4954	0.5851	0.2584	0.2568	0.4194	**0.0020*****	0.3495	0.6988	0.1096	**0.0104*****
Industry transport	−0.0166	−0.0035	−0.0040	−0.0023	−0.0002	0.0004	0.0040	0.0051	0.0034	**−0.0229**	−0.0250
	0.1245	0.7880	0.7161	0.6286	0.9634	0.9590	0.3518	0.3748	0.3276	**0.0004*****	0.2089
Oil and gas producer	−0.0017	**0.0041**	0.0110	**−0.0075**	0.0072	−0.0104	−0.0012	−0.0072	0.0119	−0.0188	0.0109
	0.7243	**0.0276****	0.4255	**0.0421****	0.2205	0.2836	0.7688	0.3029	0.3059	0.3681	0.4326
Personal goods	0.0086	0.0206	−0.0224	0.0110	**−0.0109**	−0.0181	0.0024	−0.0028	−0.0141	−0.0024	0.0055
	0.5775	0.4002	0.1013	0.2942	**0.0493****	0.1349	0.7087	0.5108	0.1267	0.7370	0.6391
Pharmaceutical and bio	−0.0109	**−0.0066**	0.0008	0.0172	−0.0006	0.0226	−0.0030	−0.0083	**0.0033**	0.0074	−0.0087
	0.2127	**0.0420**	0.9146	0.2927	0.7076	0.2770	0.6558	0.2897	**0.0264****	0.5355	0.2440
Travel and leisure	−0.0019	**0.0133**	−0.0098	0.0121	−0.0028	−0.0068	0.0061	0.0030	−0.0011	−0.0074	0.0023
	0.4828	**0.0283****	0.3521	0.1692	0.6732	0.5314	0.2775	0.4772	0.8007	0.3438	0.5258

government's effort in preserving the environment while instilling environment-friendly values among the public and businesses. Those industries are food producers (1.10%) and oil and gas producer (–0.75%), at a significant level of 5%.

The announcement of Budget 2022 on 29 October 2021 showed Malaysia's commitment towards becoming a carbon neutral country as early as 2050. Electric cars in Malaysia: An overview (2013). Efficacy from this announcement shows positive reaction from automobile and parts (2.20%) and metal and mining (0.74%), at a significant level of 5%.

5. Result: Cumulative abnormal returns (CAR) for industry groups within the event windows of (–1,1), (–3,3), (–5,5), (–10,10), (–1,1) and (–3,3)

Based on Table 4, on 9 October 2009, Malaysia launches national green technology policy (2009). Three industries namely food producer, metal and mining, and travel and leisure showed signs of significancy towards this announcement. Food producers showed cumulative abnormal returns of 2.83% (11-days) and 3.40% (21-days), whilst metal and mining showed positive and significant returns of 4.04% (7-days) and 4.64% (21-days). These two industries support Malaysia's environmental policies on reducing CHG. In contrast, the travel and leisure industry reacted negatively and significantly at 1.71% during the 3-day event (–1, 1). In Malaysia, travel and leisure is considered a heavy-polluter industry, contributing 2.9% emission of pollutants to the atmosphere (Development of Statistics, 2024). Guo et al. (2020) argued that when the government releases new stringent regulations, the potential profitability of heavy polluting industries is likely to decrease, which further induces stock prices to decrease.

On 4 January 2010, the first GTFS was launched and captured positive abnormal returns for chemical and construction (2.05%), travel and leisure (1.33%), food producer (0.68%), and oil and gas producer (0.41%). Only the pharmaceutical and bio industry reacted negatively (0.66%) at a significant level of 10%. The establishment of the GTFS is an effort to improve supply utilising the Green Technology finance. The scheme could benefit companies which are producers and users of green technology. As a sign of commitment, the government will bear 2% of the total interest/profit rate. This scheme is implemented by the government on a continuous basis since the launch of the Small Renewable Energy Power Programme (SREP) in 2001. Two SREP projects had been successfully implemented namely the TSH Bioenergy project in Tawau (10 MW) which is the first grid connected biomass power plant in Malaysia using the fuel mixture of empty fruit bunch (70%), fiber (20%) and dry shell (10%) from palm oil wastes, and the Jana Landfill in Puchong (2 MW) which is the first landfill gas power plant in Malaysia (Jalal & Bodger, 2009).

On 2 April 2010, seven out of 11 industries showed mixed results and a significant relationship with the announcement of the National Renewable Energy (RE) and Action Plan (NREPAP). The plan has been continuously implemented since the launch of the Small Renewable Energy Power Programme (SREP) in 2001.[4] There are four existing renewable energies in Malaysia namely biomass, solar, wind, and mini hydropower, all of which do not contribute to air pollutants or greenhouse gases. The implementation of this project/plan depends on the availability of sources, geographic area, and cost-development. Thus, three industries namely electricity and equity (3.64%), metal and mining (2.18%), and pharmaceutical and bio (4.50%) showed positive cumulative abnormal returns of (–5, +5) and (–10, 10) at a significant level of 10%. These industries deeply support environmental government action plans to encourage developments which produce benefits for the society and economy. Nevertheless, four industries reacted negatively and significantly at a 10% level namely chemical and construction, food producer, personal goods, and travel and leisure. The results indicate that the industries which adapt ESG showed poor reactions towards the implementation of the renewable energy (RE) policy and action plan (NREPAP).

On 3 January 2011, the 'No Plastic Bag Day' campaign was introduced by the Ministry of Domestic Trade Cooperatives and Consumerism (MDTCC), banning free plastic bags on every weekend. The objective is to conserve and maintain the condition of the environment by reducing single-use plastics and adding a levy of RM0.20 per plastic bag in grocery stores (Chen et al., 2021). Nearly all states in Malaysia had implemented this campaign especially during weekends. Zen et al. (2013) surveyed 262 households in Johor and found that 67% support the anti-consumption of plastic bags, while 33% are partial to the movement (Zen et al., 2013). Another study showed that 66% of the residents in Selangor are willing to

Table 4. Cumulative Abnormal Returns (CAR) for Industry Groups within the Event Windows (–1,1), (–3,3), (–5,5), (–10,10), (–1,1) and (–3,3).

	9 October 2009	4 January 2010	2 April 2010	3 January 2011	23 October 2012	11 July 2013	12 April 2016	27 July 2017	3 May 2018	6 November 2020	29 October 2021
Automobile and parts											
CAR(–1,1)	0.0191	0.0106	0.0234	**0.0390**	0.0070	−0.0160	−0.0073	−0.0097	0.0282	0.0198	**0.0527**
	0.5596	0.4479	0.4953	**0.0960***	0.5025	0.1832	0.4207	0.5686	0.2526	0.4501	**0.0515***
CAR(–3,3)	−0.0029	0.0026	0.0098	**0.0684**	−0.0050	0.0012	0.0145	−0.0095	0.0364	0.0227	0.0241
	0.9143	0.9081	0.8184	**0.0777***	0.6610	0.9071	0.2876	0.3563	0.3004	0.6817	0.4195
CAR(–5,5)	−0.0141	0.0095	0.0078	0.0271	0.0115	−0.0089	0.0074	−0.0134	**0.1137**	0.0342	0.0774
	0.6032	0.8206	0.8653	0.4269	0.4414	0.6537	0.5189	0.2874	**0.0028****	0.5095	0.1681
CAR(–10,10)	−0.0530	0.0034	−0.0254	−0.0042	−0.0219	0.0034	0.0144	**−0.0528**	**0.0991**	0.0173	0.0989
	0.4568	0.9532	0.4778	0.9287	0.2926	0.8457	0.4061	**0.0925***	**0.0268****	0.7904	0.2842
Chemical and construction											
CAR(–1,1)	−0.0020	**0.0395**	−0.0036	−0.0033	**−0.0094**	−0.0057	**0.0084**	−0.0055	0.0045	**−0.0142**	0.0050
	0.6780	**0.0199****	0.7371	0.7728	**0.0598***	0.5492	**0.0475****	0.1906	0.5037	**0.0678***	0.4303
CAR(–3,3)	0.0182	**0.0941**	−0.0239	0.0144	0.0068	**0.0351****	−0.0012	**−0.0228**	0.0024	−0.0063	0.0009
	0.2427	**0.0344****	0.1122	0.1963	0.3039	**0.0153**	0.8752	**0.0011*****	0.7660	0.6427	0.9135
CAR(–5,5)	0.0041	**0.1433**	**−0.0430**	**0.0627**	0.0036	**0.0743**	0.0044	**−0.0368**	−0.0301	0.0082	0.0021
	0.7485	**0.0051*****	**0.0580***	**0.0030*****	0.6714	**0.0000*****	0.7071	**0.0001*****	0.2064	0.6910	0.8629
CAR(–10,10)	−0.0251	**0.1413**	**−0.0604**	**0.0429**	**0.0416**	**0.0685**	0.0143	**−0.0681**	**−0.0614**	0.0115	0.0017
	0.1275	**0.0040*****	**0.0479****	**0.0701***	**0.0619***	**0.0006*****	0.3398	**0.0000*****	**0.0420****	0.6874	0.9104
Electricity and equity											
CAR(–1,1)	−0.0137	0.0393	−0.0081	−0.0024	−0.0051	−0.0106	0.0024	−0.0093	**0.0156**	−0.0196	0.0283
	0.1915	0.3387	0.3461	0.7597	0.2057	0.3961	0.9338	0.2438	**0.0540****	0.6161	0.1402
CAR(–3,3)	−0.0161	0.0561	−0.0111	−0.0079	0.0049	−0.0037	0.0219	−0.0406	0.1061	0.0300	**0.0112**
	0.1335	0.3913	0.7485	0.7128	0.5651	0.8755	0.6133	0.2937	0.3792	0.6234	**0.0351****
CAR(–5,5)	−0.0347	0.0959	**0.0364**	−0.0151	−0.0096	0.0356	0.0467	−0.0161	0.3893	0.0148	−0.0020
	0.1541	0.3460	**0.0759***	0.5247	0.4073	0.1108	0.3913	0.4706	0.3701	0.8186	0.8808
CAR(–10,10)	−0.0554	0.1246	0.0143	−0.0093	−0.0037	−0.0122	0.0377	−0.0292	0.3138	−0.0198	−0.0078
	0.1680	0.3417	0.5615	0.8144	0.3852	0.7694	0.3525	0.4853	0.3961	0.7730	0.7752
Food producer											
CAR(–1,1)	0.0045	**0.0209**	**−0.0204**	0.0037	−0.0029	0.0075	0.0015	**−0.0085**	0.0033	**−0.0134**	−0.0030
	0.3529	**0.0034*****	**0.0024*****	0.5311	0.5302	0.1231	0.7358	**0.0361****	0.3358	**0.0432****	0.5032
CAR(–3,3)	0.0112	**0.0393**	**−0.0235**	**0.0134**	−0.0070	0.0035	−0.0020	**−0.0087**	−0.0038	0.0125	−0.0062
	0.2884	**0.0001*****	**0.0002*****	**0.0379****	0.2130	0.4781	0.6946	**0.0651***	0.5077	0.1678	0.3138
CAR(–5,5)	**0.0283**	0.0285	**−0.0161**	0.0079	**−0.0108**	0.0103	0.0025	−0.0077	**0.0174**	**0.0173**	**−0.0145**
	0.0989*	0.0119	**0.0576***	0.2284	**0.0680***	0.1386	0.6939	0.1877	**0.0478****	**0.0488****	**0.0599***
CAR(–10,10)	**0.0340**	**0.0327**	−0.0063	−0.0046	0.0026	0.0122	−0.0070	−0.0085	**0.0390**	**0.0232**	−0.0063
	0.0725*	**0.0078*****	0.5420	0.6019	0.7763	0.1653	0.3092	0.3183	**0.0002******	**0.0863***	0.5058
Gas, water, and multi–utilities											
CAR(–1,1)	−0.0005	–0.0096	0.0003	0.0313	−0.0074	−0.0041	0.0020	−0.0039	0.0040	−0.0231	0.0080
	0.9660	0.6133	0.9670	0.3525	0.4258	0.6175	0.8970	0.2131	0.6273	0.1609	0.2510
CAR(–3,3)	0.0087	0.0034	−0.0194	0.0373	−0.0094	−0.0155	0.0081	−0.0093	−0.0014	−0.0091	0.0015
	0.2976	0.8590	0.2997	0.3061	0.3815	0.3017	0.6141	0.1078	0.9402	0.7139	0.7996
CAR(–5,5)	−0.0011	0.0383	0.0061	0.0384	0.0053	−0.0067	0.0048	**−0.0178**	0.0421	**−0.0352**	−0.0091
	0.9395	0.1150	0.8085	0.3006	0.7165	0.7664	0.8140	**0.0964***	0.4650	**0.0231****	0.2286
CAR(–10,10)	0.0128	0.0340	0.0086	−0.0061	0.0208	−0.0024	−0.0039	−0.0336	0.0391	**−0.0854**	−0.0026
	0.5393	0.2900	0.8015	0.7222	0.2951	0.9312	0.8573	0.1953	0.5608	**0.0337****	0.7347

(*continued*)

Table 4. Continued.

	9 October 2009	4 January 2010	2 April 2010	3 January 2011	23 October 2012	11 July 2013	12 April 2016	27 July 2017	3 May 2018	6 November 2020	29 October 2021
Industry metal and mining											
CAR(−1,1)	0.0031	0.0089	−0.0050	0.0064	0.0015	0.0010	**0.0238**	0.0047	**0.0175**	−0.0093	−0.0052
	0.6449	0.2545	0.4661	0.2318	0.7834	0.8964	**0.0633***	0.5108	**0.0021*****	0.2345	0.7586
CAR(−3,3)	**0.0404**	0.0096	−0.0052	**0.0230**	**0.0183**	0.0111	**0.0373**	**−0.0285**	**0.0177**	0.0159	**−0.0412**
	0.0040***	0.4460	0.5227	**0.0505***	**0.0986***	0.2373	**0.0251****	**0.0104*****	**0.0405****	0.2833	**0.0225****
CAR(−5,5)	0.0254	0.0165	**0.0218**	0.0137	**0.0333**	**0.0498**	**0.0507**	**−0.0300**	**0.0461**	**0.0427**	**−0.0276**
	0.1811	0.2571	**0.0180****	0.1776	**0.0094*****	**0.0378****	**0.0293****	**0.0097*****	**0.0100*****	**0.0044*****	**0.0458****
CAR(−10,10)	**0.0464**	**0.0616**	0.0240	0.0183	**0.0431**	0.0385	**0.0404**	−0.0250	**0.0582**	**0.0705**	−0.0343
	0.0836*	**0.0008*****	0.1279	0.2856	**0.0035*****	0.1140	**0.0407****	0.1257	**0.0622***	**0.0007****	0.1828
Industry transport											
CAR(−1,1)	−0.0144	0.0035	−0.0006	−0.0011	0.0028	0.0032	0.0121	−0.0052	**0.0083**	0.0031	0.0042
	0.2218	0.7945	0.9683	0.8651	0.6845	0.7263	0.2293	0.1959	**0.0511****	0.7000	0.7162
CAR(−3,3)	0.0286	0.0028	0.0001	0.0100	0.0058	0.0122	**0.0199**	−0.0189	0.0062	−0.0312	−0.0254
	0.3980	0.8723	0.9959	0.3360	0.3770	0.3247	**0.0699***	0.1347	0.5020	0.1924	0.2004
CAR(−5,5)	0.0253	0.0133	0.0144	0.0063	0.0027	**0.0329**	**0.0255**	**−0.0249**	**0.0533**	**0.0808**	−0.0471
	0.4678	0.5050	0.5170	0.6851	0.7919	**0.0112*****	**0.0988***	**0.0728***	**0.0229****	**0.0081*****	0.1438
CAR(−10,10)	0.0186	0.0406	0.0121	0.0522	0.0170	**0.0284**	0.0167	−0.0243	0.0243	**0.0998**	−0.0694
	0.5984	0.1219	0.6506	0.1935	0.1249	**0.0982***	0.3424	0.1777	0.3507	**0.0176****	0.1591
Oil and gas producer											
CAR(−1,1)	−0.0125	0.0025	−0.0020	−0.0144	0.0088	−0.0123	−0.0053	0.0753	0.0540	−0.0451	−0.0060
	0.5760	0.3914	0.6496	0.2384	0.6803	0.1036	0.8793	0.2355	0.1314	0.2128	0.6066
CAR(−3,3)	0.0449	−0.0034	0.0215	−0.0234	0.0120	−0.0013	−0.0141	0.1340	**0.0182**	0.0382	−0.0234
	0.5361	0.2723	0.5880	0.2967	0.5220	0.1207	0.7641	0.3775	**0.0743***	0.3613	0.2418
CAR(−5,5)	0.0416	−0.0053	0.0335	−0.0078	0.0325	−0.0094	−0.0387	0.1702	**0.1635**	0.0149	−0.0326
	0.5844	0.4773	0.5744	0.5532	0.5251	0.3771	0.5650	0.3141	**0.0855***	0.1192	0.2981
CAR(−10,10)	0.0414	−0.0173	0.0186	0.0502	0.0293	−0.0136	−0.0642	0.1483	−0.0213	0.1168	−0.0222
	0.5235	0.1653	0.7036	0.5237	0.7443	0.3977	0.6387	0.2959	0.8897	0.1596	0.6105
Personal goods											
CAR(−1,1)	0.0151	0.0061	−0.0281	0.0121	0.0082	**−0.0177**	**−0.0107**	−0.0060	0.0108	−0.0077	0.0116
	0.3909	0.7232	0.1580	0.2623	0.4780	**0.0723***	**0.0180****	0.5277	0.3913	0.4536	0.3730
CAR(−3,3)	0.0310	0.0587	**−0.0756**	0.0095	0.0439	0.0126	0.0064	**−0.0226**	−0.0108	−0.0069	−0.0066
	0.1427	0.1046	**0.0513****	0.5266	0.1023	0.4909	0.4621	**0.0232****	0.5673	0.5739	0.7526
CAR(−5,5)	0.0428	0.0141	−0.0108	0.0114	0.0385	0.0282	0.0169	−0.0111	0.0204	−0.0304	−0.0058
	0.1713	0.8108	0.4725	0.3973	0.1436	0.3378	0.2024	0.3539	0.4187	0.1610	0.8439
CAR(−10,10)	0.0604	0.0351	−0.0234	0.0175	−0.0057	−0.0192	**0.0354**	**−0.0728**	**0.0810**	**−0.0724**	−0.0392
	0.2394	0.5041	0.2227	0.3761	0.7843	0.6535	**0.0812***	**0.0007*****	**0.0140*****	**0.0874***	0.4858
Pharmaceutical and bio											
CAR(−1,1)	−0.0354	0.0049	0.0041	0.0118	0.0043	0.0062	0.0081	−0.0110	0.0076	−0.0256	−0.0209
	0.3224	0.3920	0.7481	0.5069	0.6317	0.8002	0.5122	0.4956	0.4526	0.1551	0.1618
CAR(−3,3)	−0.0013	0.0115	0.0099	0.0035	−0.0047	0.0254	−0.0046	**−0.0139**	0.0114	−0.0243	−0.0344
	0.9444	0.2389	0.6905	0.7729	0.7636	0.3590	0.8105	**0.0045*****	0.5656	0.2197	0.1554

(*continued*)

Table 4. Continued.

	9 October 2009	4 January 2010	2 April 2010	3 January 2011	23 October 2012	11 July 2013	12 April 2016	27 July 2017	3 May 2018	6 November 2020	29 October 2021
CAR(−5,5)	−0.0263	0.0019	−0.0566	0.0040	**−0.0400**	0.0504	0.0055	−0.0182	**0.0589**	**−0.0449**	**−0.0645**
	0.5923	0.7702	0.2769	0.8311	**0.0950***	0.1030	0.7264	0.1094	**0.0987***	**0.0020*****	**0.0774***
CAR(−10,10)	0.0232	−0.0161	**0.0450**	0.0276	0.0192	0.0468	0.0162	0.0011	**0.0802**	**−0.1074**	0.0004
	0.3052	0.7066	**0.0701***	0.3795	0.5137	0.1761	0.5131	0.9609	**0.0670***	**0.0057*****	0.9776
Travel and leisure											
CAR(−1,1)	**−0.0171**	**0.0209**	**−0.0150**	**0.0241**	0.0081	−0.0162	0.0077	−0.0079	−0.0082	0.0023	0.0136
	0.0162**	**0.0415****	**0.0138*****	**0.0779***	0.3256	0.3670	0.3231	0.2217	0.4236	0.9239	0.1137
CAR(−3,3)	0.0097	**0.0289**	**−0.0365**	**0.0437**	0.0221	−0.0224	0.0117	**−0.0285**	−0.0063	0.0529	−0.0080
	0.2494	**0.0079****	**0.0366****	**0.0186****	0.1427	0.1292	0.2548	**0.0177****	0.6599	0.1843	0.5619
CAR(−5,5)	−0.0224	**0.0304**	0.0024	**0.0413**	**0.0446**	0.0189	0.0133	**−0.0275**	**0.0872**	0.0569	−0.0019
	0.1237	**0.0437****	0.8317	**0.0065*****	**0.0539****	0.1056	0.2849	**0.0849***	**0.0132*****	0.2934	0.9302
CAR(−10,10)	−0.0043	**0.0608**	0.0104	**0.0803**	**0.0657**	−0.0173	0.0037	**−0.0437**	**0.0619**	0.0404	−0.0143
	0.7655	**0.0119*****	0.5328	**0.0029*****	**0.0139*****	0.1858	0.7967	**0.0115*****	**0.0361****	0.4764	0.4295

support the campaign, while only 35% in Kuala Lumpur are willing to do the same (Chen et al., 2021). Despite the lack of studies on the willingness to support this campaign, evidence found in Johor and Selangor showed that the percentage of likelihood exceeded 50%. Thus, the likelihood of residents to support this campaign throughout the nation is high. Moreover, five industries showed positive reactions namely automobile and parts (3.9%), chemical and construction (6.27%), food producer (1.34%), metal and mining (2.30%), and travel and leisure (2.41%). Meanwhile, Kirat (2021) stated that Malaysia ranks second among Asian countries in terms of plastic usage, reaching as much as 16.78 kg per person. This resulted in a negative reaction from oil and gas producer, as the two primary components of plastic production are petroleum and natural gas (Ahsan et al., 2020).

On 23 October 2012, the Green Investment Tax Allowance (GITA) and Green Income Tax Exemption (GITE) became the government's first steps in the process of introducing carbon tax to achieve carbon neutrality by 2050. This scheme represents the government's intention to encourage businesses to accelerate their usage of ESG-focused technology and embark on green projects. Nevertheless, most of the sectors reacted negatively towards the announcement, with the personal goods sector reacting significantly at a 5% level. One possible reason for this is that, since this scheme focuses on heavy-polluter sectors aligned with the adoption of ESG, every company is required to disclose in their report about their environmental, social and governance (ESG) activities to the investors, thus affecting investor sentiment about their performance. A similar finding was highlighted by Hamilton (1995) and Guo et al. (2020).

On 11 July 2013, the GGP was introduced. It refers to the procurement of suppliers, services and works by the public sector which takes into consideration the environmental criteria to conserve and minimize environmental impacts, accelerate the national economy, and promote sustainable development.[5] There are four elements evaluated by the GGP namely: (1) establishment of eco label certification, (2) establishment of the GP procedure, (3) acceptance of GP practice in agencies as well as the private and public sectors, and (4) identification of companies certified in green technology. By 2020, all government offices will implement the GGP, and 20% of purchases of selected products or services procured by the public sector will be green-labelled. The efficacy of the GGP had resulted in several industries generating returns to shareholder wealth in the short-term such as chemical and construction (3.51%), metal and mining (4.98%), and transport (3.29%). These are heavy-polluter industries which have engaged in many change programs and projects to encourage the adoption of the GGP such as the Environment Management System (EMS) and Environmental Management Plan (EMP). However, investors from the personal goods industry overreacted negatively at −1.77% towards the GGP implementation.

On 12 April 2016, following the announcement of Malaysia's signing of the Paris Agreement, four out of 11 industries showed positive reactions at a significant level of 10%. The industries are chemical and constructions (0.84%), metal and mining (5.07%), transport (3.29%), and personal goods (3.54%). This shows that these industries support the government's move in signing the Paris agreement with a commitment to reduce GHG emissions by 45% by 2030. This will be achieved through reductions in the energy, agriculture and land use change and forestry (LULUCF) sectors. Only automobile and parts reacted negatively at −1.23% at a 10% significant level. One possible reason for this is that when the government attempts to reduce the emissions released by the sectors without supporting them financially, the sectors may be forced to change their management in terms of manufacturing and operation, thus leading to their negative reactions.

On 27 September 2017, most of the industries reacted negatively towards the announcement of the issuance of Malaysia's First Green (2017) namely Automobile and Parts (5.28%), Chemical and Construction (6.81%), Food Producer (0.85%), Gas, Water and Multi-Utilities (1.78%), Metal and Mining (3%), Transport (2.49%), Personal Goods (7.28%), Pharmaceutical and Bio (1.39%), and Travel and Leisure (4.37%). A sukuk that meets those criteria and provides funding to a specific environmentally-sustainable infrastructure project such as the construction of renewable energy generation facilities could be particularly attractive to environment-focused investors for two particular reasons namely reasonable risk-adjusted returns and proper marking. This result is in contrast to that of Laborda and Sánchez-Guerra (2021) and Wang et al. (2020).

On 3 May, most of the industries showed positive and significant reactions towards the announcement of the launch of the GTFS earmarked up to RM5 billion. The industries are chemical and construction with a CAR of 4.2% (−10, +10), automobile and parts (11.37%), electricity and equity (1.56%), food producer

(3.90%), metal and mining (5.82%), transport (5.33%), oil and gas producer (16.35%), personal goods (8.10%), pharmaceutical and bio (8.02%), and travel and leisure (8.72%) all at a significance level of 10%. Nevertheless, this scheme was discontinued due to political changes and the new government formation.

On 6 November 2020, the government announced the extension period for the green technology financing scheme and upgraded it from GTFS 2.0 to GTFS 3.0. The focus of GTFS 3.0 is on the heavy-pollution sector such as energy, building, transportation and natural resources, with several targets such as the plan to increase the number of green manufacturers to 17,000 by 2030, reduce carbon emissions of transportation, and increase the number of electric mobility to 100,000 electric cars, 100,000 electric motorcycles, 125,000 charging stations, and 2000 electric buses by 2030 (Green Technology Financing Scheme 3.0, n.d.). Moreover, GTFS 3.0 also includes plans for the development of 1,750 green buildings to be certified by 2030. Several sectors demonstrated mixed reactions towards this announcement such as the chemical and construction sector which reacted negatively at 1.42%; gas, water and multi-utilities (8.54%); industry transport (–2.29%); personal goods (7.24%), and pharmaceutical and bio (10.74%). Meanwhile, food producer (2.32%), metal and mining (7.05%), and transport (9.98%) generated positive significant returns to shareholder wealth at a 10% significance level. There are several plausible explanations for this based on the result. Firstly, these sectors reacted negatively due to the policy and requirement changes which must be met as stated by the government. Secondly, the sectors had less incentive to invest in pollution control due to weak environmental regulations. Meanwhile, the positive reactions show that the industries support the government's incentive to implement green technology.

The announcement made on 29 October 2021 demonstrates Malaysia's commitment in contributing to low-carbon economy through incentive and policies stated in the Budget 2022 memorandum. Two industries generated positive abnormal returns to shareholder wealth namely automobile and parts (5.27%) and electricity and equity (1.12%) at a significant level of 5%. These two sectors indeed support the government's effort in reducing CGH until year 2050. In addition, these environmental policies support and improvise existing action plans. For example, in year 2013, the first electric car launched in Malaysia was the Mitsubishi i-MiEV followed by Nissan and Proton (local automotive production company) (Epatgo.com, 2013). Furthermore, Greentech Malaysia under the Ministry of Energy, Science, Technology, Environment & Climate Change had imported 17 Tesla cars and leased them to the government and companies to promote electric vehicles (or EVs) (Ahmad, 2017). Meanwhile, several industries showed negative and significant overreactions towards the announcements such as food producer (1.45%), metal and mining (4.12%), and pharmaceutical and bio (6.45%) all at a 5% significance level.

6. Discussion

The implementation of various policies and programs shows that Malaysia is committed to accelerate a transition to a low-carbon economy. This effort has increased awareness regarding the importance of green economy and renewable energy in a sustainable energy system. Malaysia must strive to increase its efforts in attaining greater efficiency in energy conversion, transmission, and utilization. For the first objective, the study deduces that almost all the results of the announcements' effects (Tables 3 and 4) are consistent with that of studies on developed countries (see, for example, Guo et al., 2020; Laborda & Sánchez-Guerra, 2021; Ramiah et al., 2013; Robinson et al., 2018; Tang & Zhang, 2020) which documented mixed reactions (positive and negative) for the short-term period. Thus, the results support hypothesis (*H1*), which asserts that green policy announcements pose an effect on the stock return of heavy-polluter industries. The positive returns to shareholders show that green policy announcements by the government create value-enhancing shareholder wealth. As for the negative reactions, investors' behaviour and perceptiveness are shown to play an important role in stock performance as claimed by Ishak et al. (2022). As for the second objective (to accept *H2*), ESG-adopting companies in three industries (Table 4) namely chemical and construction, metal and mining, and travel and leisure showed mixed reactions (positive and negative) towards 11 green policy announcements. The reactions depended on the ESG companies' score whereby those less than 50 are considered as poor ESG adoption (Bakri et al., 2022; Wong et al. (2021). Nevertheless, the study was unable to demonstrate the actual effect of green policy announcement on the ESG-adopting companies due to limitation of sample size.

7. Conclusion

We conducted a study using an event sample of green policy announcements related to 251 heavily-polluted industries from 9 October 2009 to 29 October 2021. The study has two main objectives: (a) to investigate the impact of green policy announcements on the stock returns of heavy-polluter industries, and (b) to examine the influence of ESG adoption by heavy-polluter industries on shareholders' value. Based on our findings, we concluded that green policies announced by the government in various platforms had attracted the attention of investors in Malaysia, resulting in mixed reactions to the announcements.

This study has important implications, both theoretical and practical. The theoretical implications include the highlighting of underexplored impacts of green policy announcements on the stock returns of heavy-polluter industries in Malaysia. The study found abnormal returns and changes in volatility surrounding these announcements, with a primary reliance on the stakeholder theory.

Practically, the implications of this study can be viewed from five perspectives. Firstly, investors, portfolio managers, and regulators can benefit from understanding the impact of stock returns on maximizing shareholders' wealth. Secondly, individual and institutional investors as well as portfolio managers can use the ESG practices as a performance indicator for their investment decisions. Thirdly, the government can benefit from ratifying green policies to promote a green environment as an effective means of maximizing shareholders' value. Furthermore, the findings provide insights to the government in implementing environmental taxes to reduce greenhouse gas emissions (GHG) in Malaysia. From a theoretical standpoint, in an efficient market, investors should not be able to make abnormal profits once the announcement is made. If share prices fail to incorporate the information related to environmental events, it would be inconsistent with the efficient market hypothesis. From a management or company perspective, investing in green initiatives enables heavily-polluting companies to transform into more energy-efficient and less polluting firms, fulfilling their social, environmental, and governance (ESG) responsibilities. This may include receiving government subsidies and tax incentives for environmental investments and technological innovations.

Lastly, future research could employ qualitative methods such as interviews with key informants, particularly from the corporate strategy division. Combining qualitative methods with quantitative analysis would provide an in-depth understanding of current practices and the implementation of ESG strategies and risk management within organizations. Incorporating mixed methods, as suggested by Sekaran and Bougie (2016), would enable more in-depth examination of the current practice in the field of interest.

Notes

1. The selection of specific industries is based on the Environmental Essentials Siting of Industries in Malaysia (EESIM), published by the Ministry of Natural Resources and Environment, Malaysia.
2. ESG adopters and non-adopters are preferably separated into the two groups. However, since only 15% of the total data is on the ESG adopters, this study had to combine them into one group.
3. By using same event window (121-day), the data for 11 sectors is separately measured with the 11 green policy announcements. The data will be provided upon request.
4. This programme was the first step to encourage and intensify the utilization of renewable energy in power generation.
5. Product, equipment or systems that minimize degradation to the environment, have zero or low greenhouse gas (GHG) emission, safe for use and promote healthy and improved environment for all forms of life, conserve the use of energy and natural resources and promote the use of renewable resources.

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References

Abdul Manaf, N., & Abbas, A. (2019). Economic and environmental sustainability of low-carbon power generation: Relevancy in the Malaysia Green Technology Master Plan (GTMP). *Journal of Chemical Technology & Biotechnology*, *94*(5), 1425–1432. https://doi.org/10.1002/jctb.5901

Ahmad. (2017). Retrieved from: https://www.nst.com.my/news/2017/03/222418/why-malaysians-wont-be-able-buy-tesla-any-time-soon.

Ahsan, H. M., Zhang, X., Liu, Y., Wang, Y., Li, Y., Li, B., Wang, J., & Liu, S. (2020). Stable cellular foams and oil powders derived from methylated microcrystalline cellulose stabilized Pickering emulsions. *Food Hydrocolloids*. *104*, 105742. https://doi.org/10.1016/j.foodhyd.2020.105742

Albino, V., Balice, A., & Dangelico, R. M. (2009). Environmental strategies and green product development: An overview on sustainability-driven companies. *Business Strategy and the Environment*, *18*(2), 83–96. https://doi.org/10.1002/bse.638

Bakri, M. A., Jalil, M. I. A., & Hassan, Z. (2022). Can ESG increase firm value in the banking institution and financial services in Malaysia? An Insight from Social Norm Theory. *Global Business & Management Research*, *14*(3), 209–221.

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics*, *14*(1), 3–31. https://doi.org/10.1016/0304-405X(85)90042-X

Bursa Malaysia. (2024). 2016 *Corporate Social Responsibility (CSR)*. Retrieved from https://www.bursamalaysia.com/about_bursa/sustainability/yayasan-bursa-malaysia/csr-pillars

Chen, Y., Awasthi, A. K., Wei, F., Tan, Q., & Li, J. (2021). Single-use plastics: Production, usage, disposal, and adverse impacts. *The Science of the Total Environment*, *752*, 141772. https://doi.org/10.1016/j.scitotenv.2020.141772

Ch'ng, P.-C., Cheah, J., & Amran, A. (2020). Eco-innovation practices and sustainable business performance: The moderating effect of market turbulence in the Malaysian technology industry. *Journal of Cleaner Production*, *283*, 124556. https://doi.org/10.1016/j.jclepro.2020.124556

D'Angelo, V., Cappa, F., & Peruffo, E. (2022). Green manufacturing for sustainable development: The positive effects of green activities, green investments, and non-green products on economic performance. *Business Strategy and the Environment*, *32*(4), 1900–1913. https://doi.org/10.1002/bse.3226

Development of Statistics Malaysia. (2024). 2016 Heavy Polluter Industry Report. Retrieved from https://v1.dosm.gov.my/v1/index.php?option=com_content&view=article&id=293&lang=en

Electric cars in Malaysia: An overview. (2013). Retrieved from https://www.expatgo.com/my/2013/08/17/electric-car-malaysia/.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, *25*(2), 383–417. https://doi.org/10.2307/2325486

Guo, M., Kuai, Y., & Liu, X. (2020). Stock market response to environmental policies: Evidence from heavily polluting firms in China. *Economic Modelling*, *86*, 306–316. https://doi.org/10.1016/j.econmod.2019.09.028

Green Technology Master Plan Malaysia 2017–2030. (2017). In Policy (Issue October). https://www.mestecc.gov.my/%0Ahttp://lcsrnet.org/pdf/locarnet_meetings/2015/4th_annualmeeting/day1/KS1-2.pdf%0Ahttp://www.kettha.gov.my.

Hamilton, J. T. (1995). Pollution as news: Media and stock market reactions to the toxics release inventory data. *Journal of Environmental Economics and Management*, *28*(1), 98–113. https://doi.org/10.1006/jeem.1995.1007

Ishak, N., Shahar, H. K., Mohd, K. N. T., Japang, M., Jamil, N., & Char, A. K. (2022). Cyclical and non-cyclical industry stock price reaction towards Movement Control Order (MCO), Economic stimulus package and vaccine agreement announcements: The case of Covid-19. *Global Business Review*, *2022*, 097215092211281. https://doi.org/10.1177/09721509221128147

Ishak, N., Taufil Mohd, K. N., & Shahar, H. K. (2020a). Effects of ownership and board structures on acquisitions returns. *Pertanika Journal of Social Sciences & Humanities*, *28*(3), 2325–2341.

Ishak, N., Taufil Mohd, K. N., & Shahar, H. K. (2020b). Does investors react in long-term? The case of Malaysian acquisition. *Cogent Business & Management*, *7*(1), 1857593. https://doi.org/10.1080/23311975.2020.1857593

Jaafar, M. Z., Kheng, W. H., & Kamaruddin, N. (2003). Greener energy solutions for a sustainable future: Issues and challenges for Malaysia. *Energy Policy*, *31*(11), 1061–1072. https://doi.org/10.1016/S0301-4215(02)00216-1

Jalal, T. S., & Bodger, P. (2009). *National energy policies and the electricity sector in Malaysia* [Paper presentation]. 2009 3rd International Conference on Energy and Environment (ICEE) (pp. 385–392). IEEE. https://doi.org/10.1109/ICEENVIRON.2009.5398618

Jiang, Y., & Luo, L. (2018). Market reactions to environmental policies: Evidence from China. *Corporate Social Responsibility and Environmental Management*, *25*(5), 889–903. https://doi.org/10.1002/csr.1505

KeTTHA. (2017). *Green Technology Master Plan Malaysia 2017–2030 (GTMP)*. Ministry of Energy, Green Technology and Water (KeTTHA).

Khan, S. A. R., Umar, M., Asadov, A., Tanveer, M., & Yu, Z. (2022). Technological revolution and circular economy practices: A mechanism of green economy. *Sustainability*, *14*(8), 4524. https://doi.org/10.3390/su14084524

Klassen, R. D., & McLaughlin, C. P. (1996). The impact of environmental management on firm performance. *Management Science*, *42*(8), 1199–1214. https://doi.org/10.1287/mnsc.42.8.1199

Kirat, K. (2021). Retrieved June 20, from, 2021, https://www.therakyatpost.com/living/2021/06/20/malaysias-plastic-problem-everyone-forgot-what-you-can-do-about-it/

Laborda, J., & Sánchez-Guerra, Á. L. V. A. R. O. (2021). Green Bond Finance in Europe and the Stock Market Reaction. *Studies of Applied Economics*, *39*(3), 125. https://doi.org/10.25115/eea.v39i3.4125

Levi, M., & Newton, D. (2016). Flash of green: Are environmentally driven stock returns sustainable? *Managerial Finance*, *42*(11), 1091–1109. https://doi.org/10.1108/MF-10-2015-0291

Lyon, T., Lu, Y., Shi, X., & Yin, Q. (2013). How do investors respond to Green Company Awards in China? *Ecological Economics*, *94*, 1–8. https://doi.org/10.1016/j.ecolecon.2013.06.020

MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of Economic Literature*, *35*(1), 13–39.

Malaysia Government Policies. (2012). Malaysia, government policies on green loans, sukuk have been in place since. Retrieved from https://www.treasury.gov.my/pdf/bajet/ucapan/ub21.pdf.

Malaysia's First Green. (2017). Malaysia's First Green Sukuk under SC's Sustainable Responsible Investment Sukuk Frameworks. Retrieved from https://www.sc.com.my/resources/media-releases-and-announcements/malaysias-first-green-sukuk-under-scs-sustainable-responsible investment sukuk-framework.

Malaysian Institute of Corporate Governance. (2018). *Malaysia Code of Corporate Governance (2012)*. Retrieved from http://www.micg.org.my/

Malaysia launches national green technology policy. (2009). Retrieved from http://www.renewableenergyfocus.com/view/4421/malaysia-launches-nationalgreentechnology-policy/.

Malaysia- Thailand Joint Authority. (2017). Retrieved from https://www.mtja.org/home.php.

Meng, C. Y., Nee, T. W., & Ismail, S. (2019). The impacts of the quality of green accounting on the financial performance of plantation companies listed on bursa Malaysia. ACM International Conference Proceeding Series, 121–125. https://doi.org/10.1145/3377817.3377830

Ministry of Energy, Green Technology and Water (KeTTHA). (2013). *Green Technology Master Plan Malaysia 2017 - 2030*. In Policy (Issue October). Retrieved from https://www.mestecc.gov.my/%0Ahttp://lcsrnet.org/pdf/locarnet_meetings/2015/4th_annualmeeting/day1/KS1-2.pdf%0A http://www.kettha.gov.my-Action-delete

Pui, K. L., & Othman, J. (2019). The influence of economic, technical, and social aspects on energyassociated CO2 emissions in Malaysia: An extended Kaya identity approach. *Energy*, *181*(2016), 468–493. https://doi.org/10.1016/j.energy.2019.05.168

Rehman Khan, S. A., Ahmad, Z., Sheikh, A. A., & Yu, Z. (2022). Digital transformation, smart technologies, and eco-innovation are paving the way toward sustainable supply chain performance. *Science Progress*, *105*(4), 368504221145648. https://doi.org/10.1177/00368504221145648

Ramiah, V., Martin, B., & Moosa, I. (2013). How does the stock market react to the announcement of green policies? *Journal of Banking & Finance*, *37*(5), 1747–1758. https://doi.org/10.1016/j.jbankfin.2013.01.012

Robinson, J., Glean, A., & Moore, W. (2018). How does news impact on the stock prices of green firms in emerging markets? *Research in International Business and Finance*, *45*, 446–453. https://doi.org/10.1016/j.ribaf.2017.07.176

Saha, M., & Darnton, G. (2005). Green companies or green con-panies: Are companies really green, or are they pretending to be? *Business and Society Review*, *110*(2), 117–157. https://doi.org/10.1111/j.0045-3609.2005.00007.x

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.

Tang, D. Y., & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, *61*(December), 101427. https://doi.org/10.1016/j.jcorpfin.2018.12.001

Wang, J., Chen, X., Li, X., Yu, J., & Zhong, R. (2020). The market reaction to green bond issuance: Evidence from China. *Pacific-Basin Finance Journal*, *60*(December 2019), 101294. https://doi.org/10.1016/j.pacfin.2020.101294

White, M. A. (1996). *Corporate Environmental Performance and Shareholder Value*. 1–22. https://libraopen.lib.virginia.edu/downloads/707957685.

Wong, W. C., Batten, J. A., Ahmad, A. H., Mohamed-Arshad, S. B., Nordin, S., & Adzis, A. A. (2021). Does ESG certification add firm value? *Finance Research Letters*, *39*, 101593. https://doi.org/10.1016/j.frl.2020.101593

Xu, X. D., Zeng, S. X., & Tam, C. M. (2012). Stock market's reaction to disclosure of environmental violations: Evidence from China. *Journal of Business Ethics*, *107*(2), 227–237. https://doi.org/10.1007/s10551-011-1035-2

Zen, I. S., Ahamad, R., & Omar, W. (2013). No plastic bag campaign day in Malaysia and the policy implication. *Environment, Development and Sustainability*, *15*(5), 1259–1269. https://doi.org/10.1007/s10668-013-9437-1