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THE IMPACT OF ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) ON THE ECONOMIC GROWTH OF ASEAN-5 COUNTRIES

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ABSTRACT

ESG program has become crucial for long-term value and business resiliency through efficient use of natural resources and effective policies on social and economic aspects. A country which has a good ESG performance would achieve higher economic growth. This study examines the ESG country-level performance across the ASEAN-5 by assessing the impact of ESG on economic growth. The study utilized annual data from 1990 to 2020 for five countries - Indonesia, Malaysia, the Philippines, Singapore, and Thailand. This study constructs the ESG index at the country level by employing frequency statistics of text mining and factor analysis for each country over time. Establishing an ESG country index would better reflect the ASEAN-5 nation's progress in ESG practices. Besides that, the ARDL method was employed to establish the relationship between ESG and economic growth. The results revealed mixed impacts of ESG on economic growth, which can be attributed to the variations in ESG practices and policies across the countries. Some results showed a significant positive impact of ESG practices on economic growth, while others showed no significant or negative impact. This study emphasizes the importance of a suitable ecosystem that supports the effectiveness of ESG adoption. This study recommends several precautionary policies, such as low-interest loans, grants, and tax relief, to support a firm's resilience during pandemics.

Keywords: ESG, ASEAN-5 countries, Principal Component Analysis, Economic Growth
JEL Classifications: Q01, O40, E02, C22

1. INTRODUCTION

Encouraging sustainable development appeals to individuals worldwide who aim to safeguard the environment and guarantee their well-being. The significance of sustainable development lies in its ability to foster economic growth while ensuring that environmental harm is minimized, and future generations' needs are not compromised by current development efforts NEF. (2015). The Sustainable Development Goals (SDGs) are a crucial component of the United Nations (UN) 2030 Agenda, which seeks sustainable development. These objectives require the active participation of various stakeholders, such as individuals, corporations,

governments, and nations globally. In an effort to align their operations with the SDG objectives, profit-maximizing enterprises have incorporated the environmental, social, and governance (ESG) agenda into their business practices. The SDGs and the ESG frameworks aim to promote sustainability by addressing environmental and social issues. However, while the SDGs apply to all stakeholders, including countries and the general public, ESG primarily focuses on the business community and individual firms. Therefore, while corporations are essential stakeholders in achieving sustainable development, it is vital to ensure that ESG practices are inclusive and involve collaboration between all relevant stakeholders, including governments, non-governmental organizations (NGOs), and civil society.

ESG investing has become a crucial component of global investment strategies and has garnered the attention of policymakers, investors, and the public for promoting sustainable business practices Boffo and Patalano (2020). Every country in the United Nations has agreed to implement the 2030 Agenda for Sustainable Development. ESG integration is a key strategy for sustainable investing in the US, Canada, Australia, New Zealand, and Asia (apart from Japan). In contrast, in Japan, corporate involvement and shareholder action are the main investment components. ESG-integrated investment techniques are still in their early phases in Asia yet have great potential for development GSIA. (2016). According to the 37th ASEAN Summit's Implementation Plan for the ASEAN Comprehensive Recovery Framework, significant areas of attention for a sustainable and resilient future in ASEAN include circular economy, sustainable energy, green infrastructure, sustainable investment, and sustainable financing ASEAN. (2020).

Further, in term of the relation between ESG and country's economic growth can be viewed in many ways. Firstly, ESG may serve as a safeguard, lowering risk and ensuring market efficiency. A strong non-financial performance on ESG problems may contribute to developing trust between investors and organizations Margaretic and Pouget (2018). Secondly, the active integration of ESG policies into corporate decision-making will increase GDP growth, demonstrating to stakeholders, investors, investors, and policymakers that ESG policy implementation across sectors will result in macroeconomic benefits Zhou et al. (2020).

The implementing ESG policies can facilitate a smoother transition to a more sustainable and low-carbon economy by encouraging companies to prioritize sustainable business practices and promote long-term value creation over short-term profits. For example, investing in renewable energy infrastructure and sustainable transportation systems can create jobs and stimulate economic growth while reducing carbon emissions. However, different countries may have unique circumstances and regulations that affect their approach to ESG and their ability to integrate ESG practices into their business operations. These unique characteristics could be related to a country's regulatory framework, policies, or other factors that influence how businesses operate and are regulated.

Further, ASEAN-5 countries are concerned about more accurate data, dispersed standards and disclosure laws, and insufficient regulatory monitoring to prevent greenwashing. The exchange rate performance and government involvement in ESG investment policies of the ASEAN-5 nations vary significantly. Unfortunately, several obstacles hinder these regulations' effectiveness and dependability. For instance, Windolph (2011) listed six issues: inconsistency, unreliable information, bias, trade-offs, lack of openness, and independence. In addition, Billio et al. (2021) argued that the low overlap of ESG indexes, which results from differences in ratings provided by rating agencies, weakens the impact

of ESG investors' preferences on asset prices, thereby nullifying any influence on financial performance, even for the ESG agreement portfolio. Since the information used to determine an ESG rating and indexes varies from one rating agency to another, there is room for disagreement about the current ESG rating and indexes.

Nevertheless, among the obstacles to ESG implementation, firms in the Philippines and other countries have diverse ESG risk exposure, goals, and possibilities. An existing obstacle is the absence of a universal rating, reporting, and benchmarking system for ESG performance. This is consistent with the ESG, UN SDGs, and Climate Change Strategy in Indonesia (2022), which stated that the limitations of ESG ratings and the absence of a defined system for measuring ESG effect further reduce the value of external, third-party evaluations. According to the ASEAN. (2022) report, the pandemic has had far-reaching effects on businesses. The pandemic has expedited specific pre-existing trends in ASEAN, which must be reconsidered if the region wants to develop a more conducive working climate post-pandemic. One such trend is the diversification of supply chains from China to ASEAN, which has greatly helped businesses, including producing electric vehicles in Thailand and developing sustainable solar energy in Malaysia. To reduce the effects of automation and digital technology, it is essential to focus on labor retraining and career routes is essential.

Existing studies on ESG performance and economic growth among ASEAN-5 countries are scarce. In fact, to the best of our knowledge, previous studies on ESG practices for economic growth in the ASEAN-5 context have not been done yet. Many studies only focus on ESG practices for economic growth in the United Kingdom and other Europe countries Avetisyan and Hockerts (2017), Eccles and Viviers (2011), Luo (2022), Zhang et al. (2022), Bannier et al. (2019), De Lucia et al. (2020), and Sassen et al. (2016). In fact, according to Mahi et al. (2020), ASEAN-5 countries have the fastest-growing emerging markets compared to other countries. Therefore, studying ESG performance and economic growth among ASEAN-5 countries is pertinent. Besides that, ESG is a relatively new development concept that previous scholars and researchers have addressed as a broad term for sustainable development; this study contributes to the literature by constructing a new ESG country index and determining their effects on economic growth in ASEAN-5 countries.

Billio et al. (2021) explored the disagreement between ESG rating agencies and its consequences on identifying ESG index constituents. This issue is pertinent given the absence of data and the limited availability of reliable information on the present ESG index. Thus, this study uses a text-mining approach to construct an ESG country index score and assess the impact of ESG on economic growth in the ASEAN-5 countries. This study will employ data mining techniques, specifically the text mining word frequency statistic, to analyze news articles related to ESG. This will help to gauge the level of attention given to ESG issues.

This study provides three approaches. First, the study constructs an ESG country index score that better reflects the evolution of ESG throughout the ASEAN-5 countries. By using Google Trend analytics (which provides access to a large sample of search requests), it is possible to observe the evolution of ESG on economic growth in the ASEAN-5 countries. Second, the ARDL method was employed to establish the relationship between ESG and economic growth. Third, the study reviews the changes in the economic cycle or shock, particularly the pandemic crisis.

The remainder of this study is organized as follows. Section 2 explained the literature review, and Section 3 includes the model construction, explaining the

development of the main constructs and detailing how data were collected and synthesized. Section 4 analyses the empirical results and conducts a robust check and Section 5 summarizes the conclusions, main contributions, limitations and provides practical implications for policymakers.

2. LITERATURE REVIEW

Romer's (1990) endogenous growth theory posits that internal forces inside the economic system, as opposed to external pressures, are responsible for sustained economic growth. This theory challenges the neoclassical perspective by proposing that economic considerations influence the rate of technological innovation and, consequently, the rate of long-term economic growth. This theory begins with the observation that technological growth results from innovation, which primarily manifests as new products, processes, and markets as a result of economic activity. According to the endogenous growth theory, economic incentives to attract or retain corporate operations positively influence long-term growth. One of the first things that come to mind when focusing on this concept is that it requires investments in knowledge, human capital, research, and development (R&D), innovation, and direct investments in physical assets and basic labor. Therefore, increasing investment would increase production capacity and stimulate economic expansion. Investing in skills and education, for example, will increase labor productivity. Additionally, increasing new technology and capital will boost the economy's productivity and production capacity.

ESG Ratings and Indexes

According to Avramov et al. (2022), Brandon et al. (2021), Landi et al. (2022) and Shaikh (2022), investors face uncertainty when making sustainable investments due to the difficulty in accurately assessing a firm's actual ESG profile. Avramov et al. (2022) conducted a study using ESG rating data from six different sources, namely Asset4 (Refinitiv), MSCI KLD, MSCI IVA, Bloomberg, Sustainalytics, and RobecoSAM, all of which are market leaders in ESG ratings and widely used by practitioners and researchers. The study found that rating ambiguity leads investors to perceive the market as riskier, which drives up market premiums and reduces investor demand. Next, Brandon et al. (2021) analyzed the same database and determined that screening and ESG integration are the two most widely used approaches in responsible investing. However, ESG data tends to be limited to larger companies and more recent years. In another study, Landi et al. (2022) utilized double risk measurement and panel data analysis to examine the influence of firm social performance on corporate financial risk, as measured by an ESG evaluation. Increasing investor uncertainty regarding corporate sustainability performance is likely due to conflicting objectives between investors and investees.

Furthermore, Shaikh's (2021) study investigates the relationship between the ESG-based sustainability index and economic policy uncertainty (EPU) utilizing multiple indices, including the EPU index, equity market policy uncertainty index, and economic and political developments. The research demonstrates a significant negative correlation between the Dow Jones Sustainability Index (DJSI) and policy unpredictability. In addition, the results indicate that socially responsible investment (SRI) is more resilient than conventional equity investing because it is not affected by political and economic volatility. The empirical evidence supports the conclusion that SRI investing is not susceptible to political and economic environmental fluctuations. Next, Escrig-Olmedo et al. (2019) investigated the

evolution of criteria used by ESG rating agencies in the past decade. The study analyzed data from leading ESG rating and information providers in the financial sector between 2008 and 2018, comparing the changes in their assessment models. Despite updates to include new criteria to reflect emerging opportunities and threats, the research found that ESG rating agencies still need to fully integrate sustainability principles into their evaluation process of corporations' sustainability.

ESG and Country Economic Growth

To the best of our knowledge only a few research that measure the development of ESG at the country level. The literature regarding ESG, and country economic growth implies that countries with good ESG performance should have higher long-term economic growth, while the short-term effect is less clear. A study by Kocmanová and Dočekalová (2012) examined the method for assessing a company's economic performance in the Czech Republic concerning ESG indicators. It advocated that economic performance indicators enable businesses to assess their economic performance and contribute value toward sustainability. This means that companies should be able to monitor their economic performance and add value to achieve long-term sustainability using the specified economic performance indicators. Ferktaji (2019) utilized the Granger causality test to investigate the link between ESG performance and economic growth in 118 countries from 1999 to 2015. The research showed that the relationship between environmental and social performance and economic growth is bidirectional, while the link between governance and growth is unidirectional for all nations. However, the findings for different socioeconomic categories of countries are inconclusive, in contrast to the clear overall pattern observed in the entire sample.

Furthermore, Yawika and Handayani (2019), in their studies within Indonesia, found that the effectiveness of corporate governance has a beneficial impact on financial reporting but a negative impact on the stock market. Using multiple regression analysis to study the relationship between ESG performance and economic performance, neither corporations nor investors take environmental and social performance into account. Regarding stakeholder management, there need to be more information and sustainability measures that are irrelevant. Also, on the negative impact, a previous study discovered uncertainty regarding ESG practices and claimed that ESG performance might inhibit growth (Meher et al., 2020). Accordingto the study, ESG goals and regulations necessitate a high consumption and production process, which will limit economic growth. As goods and services already require energy to be produced, reducing energy consumption, or switching to more expensive kinds of energy will inevitably diminish the economic output.

Within the ASEAN-5 context, a lesser focus is placed on economic growth. A study done by (Tarmuji et al., 2016) compared ESG with economic growth in two countries which are Singapore and Malaysia, by using panel data analysis and data extracted from ASSET4® database of Data- Stream, by Thomson Reuters Incorporation. Using economic growth as the dependent variable and ESG practices as the independent variables, the researchers discovered that social and governance practices significantly impacted economic growth. Compared to the United States and Europe, Malaysian and Singaporean companies' ESG indices are still in their early stages of development.

The Impact of the Pandemic Crisis on Economic Growth

The empirical research on the influence of the pandemic crisis on economic growth has been growing in recent years as researchers seek to understand the extraordinary shocks that the pandemic has created, taking into account the cross-country spillovers of the virus. Also, from both the national and international levels, some research papers on the impact of the pandemic crisis on macroeconomics have been published. A study by Goel et al. (2021) examines the global supply chain logistics performance and the subsequent effects of pandemic crises on economic growth using OLS estimation for 136 countries from 2007 to 2017. The authors claimed that amid the present pandemic crisis, when supply networks are affected or undermined in various ways, countries are likely to face a heightened level of difficulty. In a worldwide economy, the bottlenecks in the supply chain may have downstream impacts that ripple across borders. These results also argue against blanket growth-promoting measures applied to countries with varying growth rates. Furthermore, Inegbedion (2021) indicated that the lockdown imposed by the pandemic crisis had had a severe impact on the country's economic operations and circular flow of money.

According to Coccia (2021), Ikram (2021), and Apergis (2021), the pandemic crisis had a detrimental influence on the GDP in recent studies. As a result of these studies, it has been found that nations with more significant healthcare investments (as a percentage of GDP) have reduced the fatality rate of the pandemic while also applying a shorter lockdown period, which has lessened the negative consequences on economic growth. Coccia (2021) indicates that exports of goods and services, logistics performance, ISO 9001 and ISO14001 certifications, notably in six heavily affected nations (India, Iran, Philippines, Bangladesh, and Pakistan) during an outbreak of a pandemic virus are all negatively affected by the pandemic crisis.

The Role of the Pandemic Crisis on the Effect of ESG on Economic Growth

Many past studies have investigated the influence of the pandemic crisis on ESG scores and performance. Financial markets were exceedingly turbulent during the first quarter of 2020 as the pandemic crisis spread over the world. During the pandemic crisis timeframe, it is critical that researchers look at the role that ESG ratings play in explaining economic growth. Díaz (2021) examined the influence of ESG in US markets by examining the three Fama-French factors that characterize stock returns (market return; size factor, which measures small enterprises' outperformance relative to large organizations; and value factor). This study found that ESG factors explain a sizable portion of industry returns. The E and S aspects are the primary determinants of the ESG impact across industries. It was noted that a similar technique used by the study of Broadstock et al. (2021) to evaluate the relationship between ESG issues and financial performance in China claimed that during the pandemic crisis, ESG performance was favorably correlated with the short-term cumulative returns of CSI300 equities.

Next, Engelhardt et al. (2021) investigated whether companies with higher ESG ratings outperformed those with lower ratings during the pandemic crisis. Their study used a sample of 1,452 companies from 16 European countries and analyzed whether firms with high CSR ratings based on Refinitiv's ESG ratings from Thomson Reuters Eikon outperformed those with deficient CSR ratings. The authors divided the dataset based on the median scores of the country characteristics and performed baseline regression models on the subsamples to investigate the relationship between the components. The study suggests that participation in ESG initiatives in countries with low levels of trust could decrease market uncertainty during the

pandemic crisis. Other than that, a study by Palma-Ruiz et al. (2020) researched the potential profitability of business strategies during global catastrophes such as pandemics. Based on a survey administered to 575 residents of Spain, this study was able to conclude that the current economic crisis will cause consumers to reevaluate their support for businesses that have been socially irresponsible or unsupportive. Furthermore, people's perceptions of businesses will change after normalcy has been restored during the pandemic.

In conclusion, existing studies have discussed the information used to determine an ESG rating and indexes, which varies from one rating to another, and the disagreement about the current ESG ratings and indexes used in measuring the performance of ESG. However, these studies did not focus on the impact of ESG practices on the economic aspect. Besides that, a limited number of studies analyze the ESG performance and economic growth of the ASEAN-5 economy because most studies only investigate the influence of environmental, social, and governance factors on economic development. Our study differs by focusing on the impact of ESG on economic growth. This study fills the gap in the literature by analyzing the possible impact of ESG practices and policies on economic growth in the ASEAN-5 countries, which is an area where there may be a need for more research.

3. DATA

This study utilizes yearly data from 1990 to 2020 for all variables. In this study, we measure each country's economic growth using GDP per capita, where the data was obtained mainly from World Bank Open Data. Next, to study the impact of ESG on ASEAN-5 countries, ESG data was obtained using ESG index score, where the score was created using a data mining technique. Data on the pandemic was obtained from the World Pandemic Uncertainty Index.

4. METHODOLOGY

4.1. CONSTRUCTING THE COUNTRY'S ESG INDEX

This study aims to investigate the impact of ESG on economic growth in ASEAN-5 countries. To achieve the objective, an ESG index is constructed. Following Borms et al. (2021), the index was created by utilizing data mining techniques and technology, particularly word frequency statistics from text mining, which show that attention would be brought to ESG if a news article about it were to be published. To the best of our knowledge, there is no universal definition of ESG. Therefore, this study uses seed terms from Borms et al. (2021) to define the environmental, social, and governance elements. Using the Google search engine, the initial search comprised ESG keywords and the names of the ASEAN-5 countries to focus on the implementation of ESG. By doing so, the original keywords for these three categories (namely environmental, social, and governance) will be established, and we will be able to effectively categorize the ESG types and cover all of the key terms associated with ESG in the ASEAN-5 nations. The final keywords used to represent the Environmental are mobility, biodiversity, and ecology. Meanwhile, for Social are, human rights, discrimination, donation, governance, bribery, corruption, and animal testing.

Table 1

Table 1 List of Category and Keywords

Environmental	Social	Governance
Environment, energy, mobility, nuclear, climate, biodiversity, carbon, pollution, waste, ecology, sustainability, emission, renewable, oil, oil leak	Society, health, human rights, social, discrimination, inclusion, donation, strike, slavery, stakeholder, employee, employer, mass fire, labor, trade union, depression, diversity	Court, budget, justice, governance, management, bribery, corruption, ethics, audit, patent infringement, gender neutral, money laundering, animal testing, lobbyism, top wage

Source Adapted from Borms et al. (2021)

Based on the discussion in the literature reviews section, the suggested expected signs of economic growth, ESG and other macroeconomic drivers are shown in Table 2.

Table 2

Table 2 Description of the Data

Variable	Abbreviation	Measurement Unit	Expected Sign	Source
Economic growth	GDP	GDP per capita (percentage, %)		World Development Indicators
Environmental, social, governance	ESG	ESG index score	+	Author's calculation
Fixed capital formation	FCF	At the constant price (the base year 2010) in log form.	+	World Development Indicators
Labor force	LF	Total	+	World Development Indicators
Population growth	PGR	Population growth (annual %)	+/-	World Development Indicators
Trade openness	OP	[(Export plus import)/GDP]	+	World Development Indicators
Pandemic uncertainty index	WPUI	% of "uncertain"	–	World Pandemic Uncertainty Index

Source World Bank Open Data and World Pandemic Uncertainty Index

Table 3 shows the results of the sampling adequacy of the ESG index. The Kaiser-Meyer-Olkin (KMO) test, Bartlett test, and Cronbach Alpha results denote greater adequacy of the factor analysis, confirming that the variables are correlated and that the items used in constructing the ESG Index have relatively high internal consistency. Thus, it is concluded that these keywords are appropriate for factor analysis. The procedure continues with extracting common factors where the eigenvalue value is more significant than one, implying that the extracted factors can reflect the information in the keywords. Finally, the first component was used to derive a score for ESG. The scores obtained are normalized to 0 and 100, where

the higher value indicates more activity on ESG or a high level of ESG. The ESG Index has been constructed for each country to determine their ESG levels over time.

Table 3

Table 3 Results of Sampling Adequacy of the ESG Index			
Variable	**Kaiser-Meyer-Olkin**	**Bartlett Test (chi-square) *****	**Cronbach Alpha**
Environmental	0.773	868.885	0.8766
Social	0.786	968.898	0.9655
Governance	0.793	903.776	0.8039
Overall ESG	0.795	1026.243	0.9886

4.2. ESTIMATION MODEL

This study adapts the standard growth model in the literature to investigate the relationship between ESG, pandemic crisis, and economic growth, and is expressed as in Equation 1:

$$Y_t = \beta_0 + \beta_1 ESG_t + \beta_2 X_t + \beta_3 \varepsilon_t \quad (1)$$

Where ESG includes the overall score of ESG and its component score, Xt is the control variable of the growth model at time t, which include fixed capital formation, labor force, government expenditure, domestic credit, trade, and population growth, while Yt is country GDP, and ε is the error term.

To capture capital investment by a corporation that results in an increase in productivity, which could result in long-term growth if strong economies are formed through investment, gross fixed capital formation is included, which is a major component of domestic investment and is viewed as an important process that could accelerate economic growth. The estimation model is presented in Equation 2.

$$Y_t = \beta_0 + \beta_1 ESG_t + \beta_2 X_1 + \beta_3 X_2 + \varepsilon_t \quad (2)$$

Further to determine the effect of pandemic uncertainty and its moderating effect of ESG on the country economic growth, the estimation models are presented in Equation 3 and 4:

$$Y_t = \beta_0 + \beta_1 ESG_t + \beta_2 X_1 {}^{*} ESG_t + \beta_3 \mathrm{WPUI}_t + \beta_4 X_2 + \varepsilon_t \quad (3)$$

$$Y_t = \beta_0 + \beta_1 ESG_t + \beta_2 X_1 + \beta_3 \mathrm{WPUI} * ESG_t + \beta_4 X_2 + \varepsilon_t \quad (4)$$

Where ESG includes the overall score of ESG and its component score, $X1$ is fixed capital formation, $X2$ is the control variable of the growth model, WPUI is pandemic uncertainty index, while Yt is country GDP, and ε is the error term (see Widarni & Bawono, 2021; Busu, 2020; Opeoluwa & Akingba, 2017).

4.3. METHOD

To achieve the objective of the study, a preliminary unit root test is conducted to determine whether trending data should be regressed on a deterministic function of time and to verify that none of the study's variables are I(2). Non-stationary time series are known to exhibit long-run equilibrium relationships, and if the variables are I(1), cointegration techniques can be employed to represent these relationships

Nkoro and Uko (2016). The Phillips-Perron (PP) test is used as the unit root test in this study, which is a modified version of the widely used Dickey-Fuller (DF) test. The PP test is similar to the DF test, but it allows for a more general class of errors and accounts for the possibility of serial correlation. The PP test is particularly useful when the time series under study has a drift or trend. This is because the PP test allows for a deterministic trend in the model, which makes it more flexible than the DF test. The PP test also automatically selects the optimal lag length, which reduces the potential for bias in the estimation Phillips and Perron (1988).

In exploring the long run relationship among dependent variable (GDP) and independent variables (ESG, pandemic, fixed capital formation, labor force, population growth, and trade openness), ARDL cointegration is used in this study. Following Pesaran et al. (2001), ARDL can assess the long-term cointegration connection between variables and to construct an error correction model (ECM) model from the ARDL model without surrendering any long-term information. This model is based on the optimization approach of ordinary least squares and is a mixed-order integration model. This method can be applied to stationary or nonstationary time series, depending on the situation. This model is employed because the ARDL approach technique allows for the examination of the effects of the dependent and independent variables through time and the effects of the past. ARDL approach technique is a key advantage of this approach to be able to identify cointegrating vectors in the presence of numerous cointegrating vectors, which is particularly useful when there are several cointegrating vectors present Menegaki (2019); Nkoro and Uko (2016).

5. EMPIRICAL RESULTS AND DISCUSSIONS

The descriptive statistics for the ESG country index score of ASEAN-5 countries are shown in Table 3. From 1990 to 2020, the mean ESG score for the ASEAN-5 countries is still low, with the highest score being 0.64. The mean environmental score for the ASEAN-5 countries between 1990 and 2020 was 0.311, which indicates that companies in the region performed poorly on environmental metrics. Similarly, the mean social score for the ASEAN-5 countries was 0.512, indicating that regional companies also performed poorly on social metrics. The standard error for the social score was 0.117, which is relatively high and further emphasizes the uncertainty of the mean estimate. The mean governance score for the ASEAN-5 countries was 1.213, indicating better performance than the environmental and social scores. However, the score is still relatively low, considering the maximum score for governance was only 2.15.

Based on Table 4, the standard deviation values range from 0.395 to 0.970, with the highest standard deviation value belonging to the overall ESG score. This suggests a wide range of overall ESG performance scores among the companies in this dataset, with some companies achieving significantly higher scores than others while some were lagging. However, when looking at the year 2001 until 2020, the mean ESG score for ASEAN-5 countries was 16.059 for environmental, 16.541 for social, 16.140 for governance, and 18.407 for overall ESG. These scores indicate that ASEAN-5 countries have made significant progress in incorporating ESG criteria into their business practices, with an overall ESG score higher than the individual scores for environmental, social, and governance. This shows that companies in ASEAN-5 countries are taking a holistic approach to ESG and are paying attention to all three areas.

Table 4

Table 4 Results of Descriptive Statistics for the ESG Index Score of ASEAN-5 Countries from 1990 to 2020.

	1990-2000				2001-2020			
	Environmental	**Social**	**Governance**	**Overall ESG**	**Environmental**	**Social**	**Governance**	**Overall ESG**
Mean	0.311	0.512	1.213	0.640	16.059	16..541	16.140	18..407
Std. Dev	0.395	0.870	0.633	0.970	24.751	24.132	27.410	26.316
Minimum	0	0	0	0	0	0	0	0
Maximum	1.530	3.719	2.150	4.023	100	I00	100	100

1990-2020				
	Environmental	Social	Governance	Overall SG
Mean	10.471	10.853	10.843	12.103
Std. Dev	21.237	20.829	23.119	22.765
Minimum	0	0	0	0
Maximum	I00	I0O	100	I00

Overall, the result shows that ESG scores for ASEAN-5 countries have progressed over the past two decades. This is evidenced by the mean ESG score of 18.407, higher than the individual scores for environmental, social, and governance. It is also supported by the minimum score for all four criteria is 0, indicating that companies are gradually adopting sustainable and ethical practices. The ESG scores for ASEAN-5 countries from 2001 to 2020 indicate that there has been progress in incorporating ESG criteria into business practices. It is important to encourage companies who have not been involved with ESG practices to adopt sustainable and ethical practices. For example, offering tax incentives or grants for ESG initiatives could be a powerful way to motivate companies to invest in sustainability. Besides that, the scores also show that the government must continue supporting companies implementing ESG practices by providing additional incentives such as public recognition or preferential treatment in government contracts.

Table 5

Table 5 Summary of Unit Root Test Results

Variable	Malaysia	Indonesia	Thailand	Philippines	Singapore
ln (GDP per capita)	I(1)	I(1)	I(1)	I(1)	I(1)
ln (Labor)	I(1)	I(1)	I(0)	I(1)	I(1)
ln (Gross capital formation)	I(1)	I(1)	I(1)	I(1)	I(1)
ln (Trade openness)	I(1)	I(1)	I(1)	I(1)	I(1)
Population growth	I(0)	I(0)	I(0)	I(0)	I(0)
ESG	I(1)	I(1)	I(0)	I(1)	I(1)
Environmental	I(1)	I(1)	I(0)	I(1)	I(1)
Social	I(1)	I(1)	I(0)	I(1)	I(1)
Governance	I(1)	I(1)	I(0)	I(1)	I(1)
WPUI	I(0)	I(0)	I(0)	I(0)	I(0)

Notes: Detail on the results are available upon request.

Table 5 shows that the variables are either stationary in terms of levels or stationery in terms of first differences based on the test results. Based on the result, none of the variables have an integration order of two. In the table above, the results of applying the one break PP unit root test with break test to each series over the

sample period for each country are displayed. Where there are series that are integrated at level, implying I(0) variables, and at first difference, there are contradictory outcomes. However, I(2) variables are not found in the sample across countries.

Table 6 reports the results of ARDL bound test. The value of F-statistics 7.112, 12.243, 10.791, 13.115, and 7.310 for estimated model for Malaysia, Indonesia, Thailand, Philippines, and Singapore respectively is greater than upper bound value at 5 percent significance level. This indicates that the null hypothesis of no cointegration among the variables of the study can be rejected, implies that there is evidence of long-run ARDL cointegration model for Malaysia, Indonesia, Thailand, Philippines, and Singapore.

Table 6

Table 6 Cointegration Bound Test Analysis

	F-statistics				
Critical value	Malaysia	Indonesia	Thailand	Philippines	Singapore
(Narayan, 2005)	7.112**	12.243**	10.791*	13.115***	7.310**
I(0): 90% -1.5213, 95%- 1.876					
I(1): 90% -3.757, 95%- 4.437					

Notes: *, ** and *** represents significance at 10%, 5%, and 1% significance levels. All models do not include intercept and trend in the estimation except for Singapore with constant.

The results on the estimated long-run ARDL cointegration model are shown in Table 5. By applying the Schwarz criterion (SC), the ESG coefficient is positive and statistically significant for Malaysia and the Philippines' economic growth at the 5% level. In contrast, the ESG is found to be statistically significant at 10% for Singapore. This positive relationship between ESG and the country's economic growth indicates that positioning the country towards achieving ESG would benefit the country's long-term growth. Directing the country's efforts toward the achievement of ESG would be beneficial to Malaysia's growth in the long run. Intuitively, a high-quality environment would safeguard natural resources such as increased biodiversity and habitat conservation and reductions in greenhouse gases (GHG), which are fundamental to a land protection and preservation plan. In addition, it reduces the expenses associated with externalities and has a favourable influence on the health of human capital, resulting in greater productivity and efficiency. This is consistent with the findings of Ayuso et al. (2020), who found that integrating social values improves economic, financial, and social values.

The Error Correction Terms are all negative and significant, showing that convergence to the long run is feasible in the models. In addition, from the results of the Breusch-Godfrey serial correlation F- test and the Breusch-Pagan- Godfrey heteroscedasticity F-test, we fail to reject the null-hypotheses of no serial correlation and no heteroscedasticity of the residuals. Therefore, the results from the model are void of spurious regression. To check the stability of the estimated parameters, this paper also performs a Cumulative Sum of Recursive Residual (CUSUM) test, as depicted in Figure 1. The line in the CUSUM plot in Figure 1 does not exceed the 5% significance level, indicating that there is no evidence of a structural change in the time series data. In other words, the estimated coefficients are consistent over time, and the model is stable.

Table 7

Table 7 Results of Long-Run Coefficient of Baseline Model

ln (GDP per capita)	Malaysia	Indonesia	Thailand	Philippines	Singapore
ln (Labor)	2.1684**	0.5576***	0.4705*	0.4625***	0.7759**
	(0.9030)	(0.1116)	(0.1593)	(0.0225)	(0.2154)
ln (Gross capital formation)	0.6833**	0.4526*	0.2241	0.2922***	-0.2346
	(0.2389)	(0.2346)	(0.1757)	(0.0774)	(0.2540)
ln (Trade openness)	2.7066***	-0.7335*	0.0022	-0.2006*	0.0586
	(0.6223)	(0.4143)	(0.4676)	(0.0567)	(0.4909)
Population growth	-8.9949***	-0.7342	-0.5037*	-0.2402	-0.0842
	(1.8619)	(0.2266)	(0.1632)	(0.1007)	(0.0951)
ESG	0.0177**	-0.0033	0.6113	0.0594**	0.0424*
	(0.0047)	(0.0026)	(0.4464)	(0.0189)	(0.0033)
Error correction term	-0.5494***	-0.2872***	-0.1700***	-0.3359***	-0.1757***
Serial correlation	3.3573	7.5176	0.9998	1.2241	2.4744
Heteroscedasticity	0.8673	0.1211	0.0027	0.7494	0.8446
Adjusted-R^2	0.3938	0.9022	0.1559	0.3278	0.6624

Notes: *, **, and *** denote significant at 10, 5, and 1 per cent significance levels. Numbers in brackets represent the robust standard error.

Figure 1

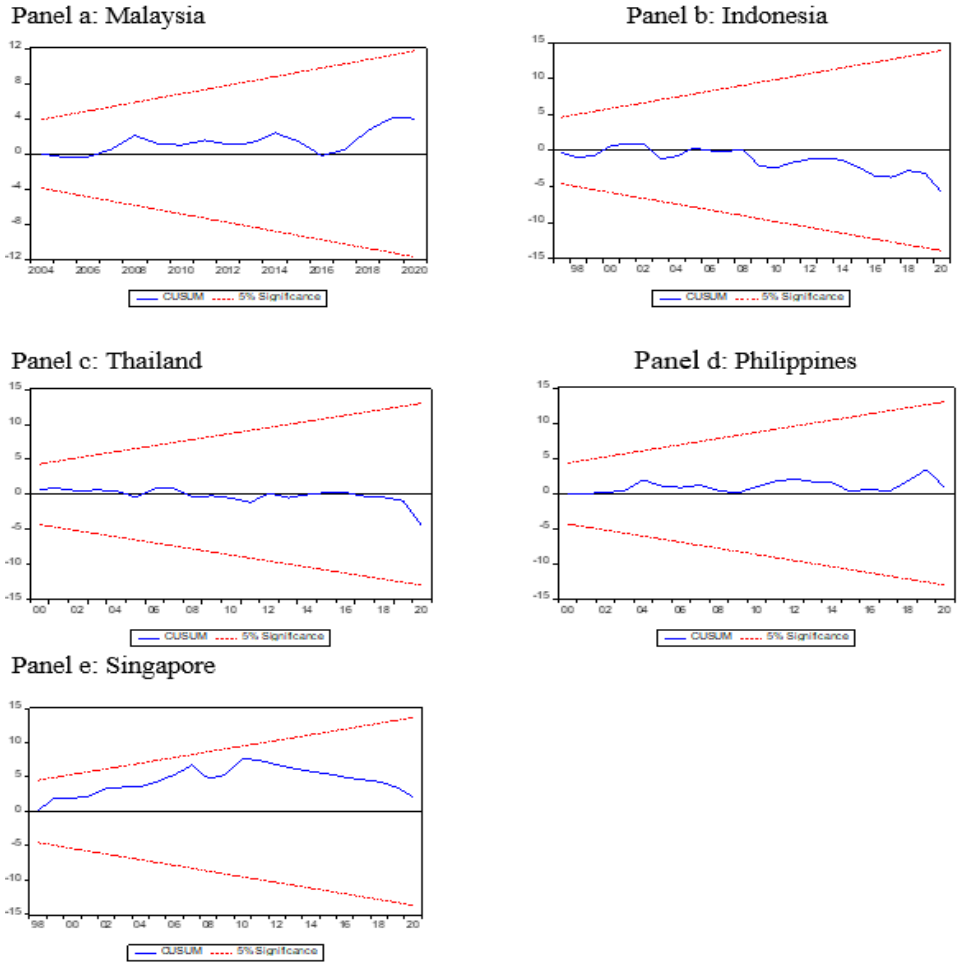

Figure 1 CUSUM Stability Test

This study also includes an important element of the pandemic since there has been economic turmoil resulted from it. Table 8 determines the impact of pandemic uncertainty on the country's economic growth. The F-statistics of the estimated models for Malaysia, Indonesia, Thailand, Philippines, and Singapore are greater than the upper bound value at a significance level of 5%, indicating the existence of a long-term ARDL cointegration model.

Table 8

Table 8 Cointegration Bound Test Analysis

	F-statistics				
Critical value	Malaysia	Indonesia	Thailand	Philippines	Singapore
(Narayan, 2005)	8.536*	8.513**	9.767*	17.899**	8.965*
I(0): 90% -1.748, 95%- 2.111					
I(1): 90% -3.664, 95%- 4.317					

Notes: * and ** denote significant at 10 and 5 percent significance levels. All models do not include intercept and trend in the estimation except for Singapore with constant.

Table 9 reports the impact of pandemic uncertainty on the economic growth in ASEAN-5. According to the results, the pandemic has had a negative and significant impact on the economic growth of Singapore and Thailand. This means that the pandemic has caused a decrease in the economic growth of these two countries. On the other hand, the impact of pandemic uncertainty on the economic growth of Malaysia, Indonesia, and the Philippines was found to be insignificant. This suggests that the pandemic did not significantly affect these countries' economic growth or that favorable global commodity prices, or strong domestic demand may have mitigated the negative impact of the pandemic on their economies. The diagnostics test indicates no evidence of higher-order autocorrelation and heteroscedasticity in the model. The CUSUM test shown in Figure 2 indicates that the models are structurally stable.

Table 9

Table 9 Results of Long-Run Coefficient: The Role of Pandemic Uncertainty on Country Economic Growth.

ln (GDP per capita)	Malaysia	Indonesia	Thailand	Philippines	Singapore
ln (Labor)	2.8804**	1.1479	0.4580**	0.4628***	0.7660***
	(1.3533)	(0.3268)	(0.1296)	(0.0371)	(0.0911)
ln (Gross capital formation)	1.3310***	0.1884	0.2000	0.2964*	-0.2541
	(0.2466)	(0.1971)	(0.1594)	(0.1143)	(0.1188)
ln (Trade openness)	1.3873**	-0.4281	0.0646	-0.0191	0.0653
	(0.3324)	(0.1753)	(0.3681)	(0.0923)	(0.2057)
Population growth	-1.3474**	-0.0262	-0.5263**	-0.5545***	-0.1069*
	(0.3332)	(0.3609)	(0.1463)	(0.0565)	(0.0491)
WPUI	-0.0294	-0.0155	-0.0034*	-0.0236	-0.0495*
	(0.0369)	(0.0053)	(0.0018)	(0.0172)	(0.0108)
Error correction term	-0.1749***	-0.4179***	-0.1915***	-0.2676***	-0.3158***
Serial correlation	0.6480	0.7589	1.4771	1.4396	0.9323
Heteroscedasticity	0.8161	0.0928	0.0860	0.6188	0.2156
Adjusted-R^2	0.8287	0.8226	0.1538	0.7745	0.6141

Notes: *, **, and *** denote significant at 10, 5, and 1 percent significance levels. Numbers in brackets represent the robust standard error.

Figure 2

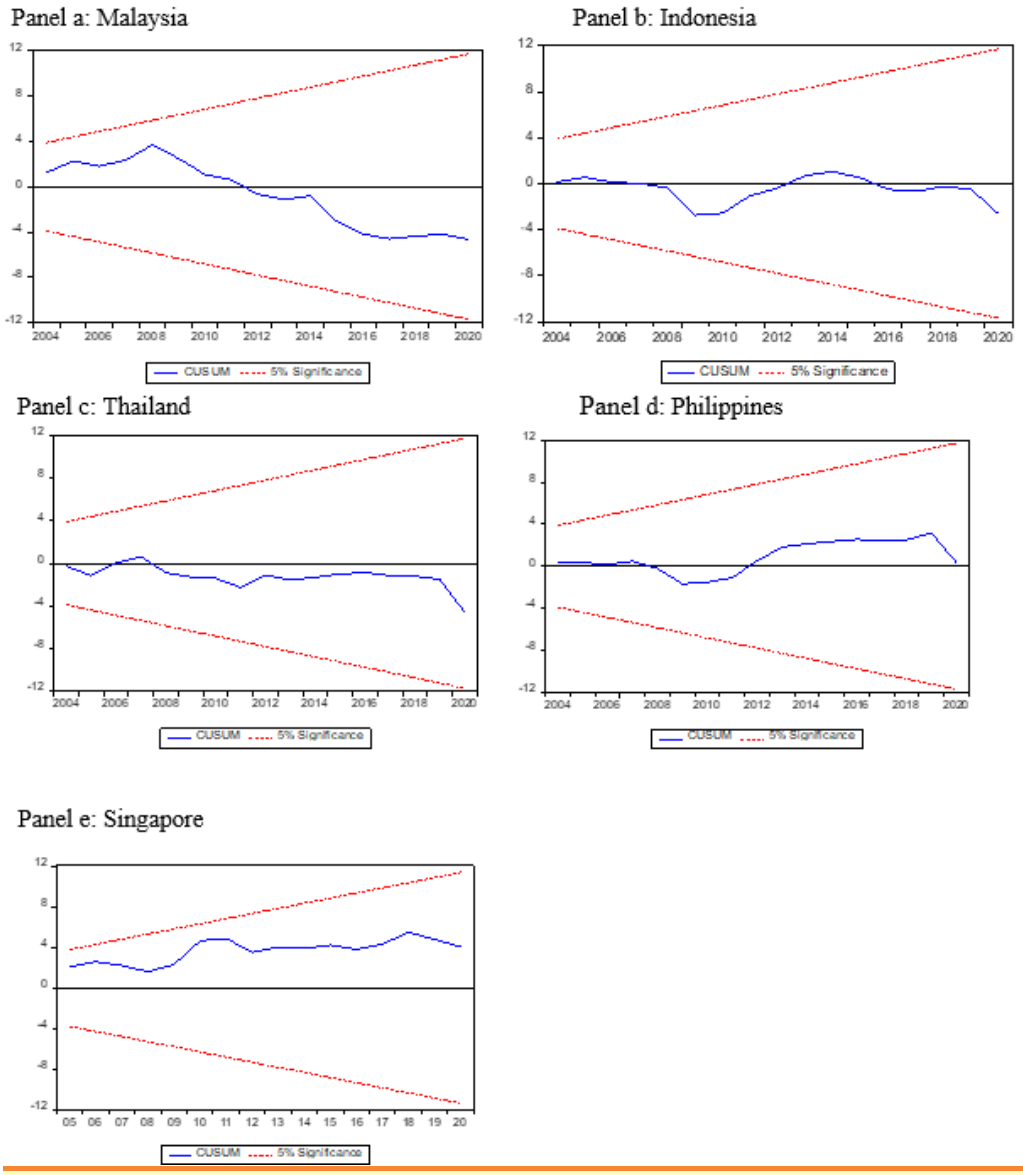

Figure 2 CUSUM Stability Test

The results of the ARDL bounds tests for the model that includes the interaction term between the pandemic crisis and ESG in the estimated growth model are presented in Table 8. The F-statistic exceeds the upper bound critical values at the 5% and 10% significance levels for Indonesia, Thailand, Philippines, Singapore, and Malaysia, respectively. This further clarifies the long-term relationship between the interaction variable of ESG and pandemic crisis, other explanatory variables, and economic growth.

Table 10

Table 10 Cointegration Bound Test Analysis

	F-statistics				
Critical value	Malaysia	Indonesia	Thailand	Philippines	Singapore
(Narayan, 2005)	8.536*	13.721**	8.985*	14.676**	8.247*

I(0): 90% -1.740, 95%- 2.114	
I(1): 90% -3.685, 95%- 4.379	

Notes: * and ** denote significant at 10 and 5 percent significance levels. All models do not include intercept and trend in the estimation except for Singapore with constant.

Table 10 provides an in-depth result to capture the complement effect that possible play by the pandemic uncertainty on the effect of ESG on economic growth. It is shown that the implementation of ESG during pandemic uncertainty has a negative and insignificant impact on economic growth for Indonesia, the Philippines, Singapore, and Thailand. This means that during times of pandemic uncertainty, the implementation of ESG activities only significantly impacts economic growth in these countries. To meet ESG goals and regulations, consumption and output must be high, which will slow economic growth, especially during a pandemic. These findings are similar to the previous studies, which indicate that the costs associated with participating in ESG activities during the COVID-19 epidemic outweighed any potential benefits Aydoğmuş et al. (2022); Tampakoudis et al. (2021).

Table 11

Table 11 Results of Long-Run Coefficient on the Role of Innovation in ESG-Growth

GDP per capita	Malaysia	Indonesia	Thailand	Philippines	Singapore
ln (Labor)	0.5409	0.6244***	0.4092*	0.4623***	0.7640***
	(0.4553)	(0.1348)	(0.1627)	(0.0478)	(0.0663)
ln (Gross capital formation)	-0.1310	0.1252	0.3301	0.3026	-0.2616*
	(0.7993)	(0.3533)	(0.2029)	(0.2696)	(0.0984)
ln (Trade openness)	0.3579	-0.8440	0.1545	-0.0171	0.0655
	(1.3674)	(0.4364)	(0.4761)	(0.1359)	(0.1554)
Population growth	-0.5935	-0.5090	-0.4769*	-0.5625*	-0.0934*
	(0.6423)	(0.3639)	(0.1724)	(0.2726)	(0.0466)
ESG	0.0003	-0.0033	-0.0795	-0.0001	-0.0010
	(0.0075)	(0.0027)	(0.5657)	(0.0039)	(0.0016)
WPUI	-0.0838	-0.0245	-0.0085*	-0.0239	-0.0253*
	(0.0845)	(0.0104)	(0.0035)	(0.0211)	(0.0110)
ESG*WPUI	0.0064	-0.0004	-0.0004	-0.0273	-0.0057
	(0.0054)	(0.0021)	(0.0034)	(0.0427)	(0.0068)
Error correction term	-0.1749***	-0.1749***	-0.1697***	-0.2626***	-0.3692***
Serial correlation	0.6480	0.6480	0.9726	1.3768	0.9367
Heteroscedasticity	0.8161	0.8161	0.0014	0.6145	0.0529
Adjusted-R^2	0.8287	0.8287	1.3815	0.9719	0.9196

Notes: * and ** denote significance at 5 and 10 percent significance levels. Numbers in brackets represent the robust standard error. The critical values are provided by Pesaran et al. (2001), unrestricted intercept, and no trend. All models include intercept in the estimation.

The results have shown that economic growth in Malaysia slowed when pandemics struck, particularly during the coronavirus (COVID-19) crisis; however, we discovered that implementing ESG activities indirectly helps solve environmental and social problems by changing the way private funds are used. This implies that although the direct impact of ESG on economic growth during

pandemics is not significant in Malaysia, other positive externalities are associated with ESG activities that can contribute to society's overall well-being. For example, companies that prioritize ESG practices may invest in measures that lead to improved public health, such as reducing air pollution or promoting sustainable agriculture practices, which can have long-term benefits for the health and well-being of the population. In addition, the Breusch-Godfrey and serial correlation F-test and the Breusch-Pagan- Godfrey heteroscedasticity F-test could not reject the null of non-normality, no serial correlation, and no heteroscedasticity problem, respectively implies the estimation is efficient and unbiased.

In addition, the graphs in Figure 3 reveal that none of the lines surpass the 5% significance level, indicating that the null hypothesis of stability is not rejected. The estimated equation is, therefore, stable over time.

Figure 3

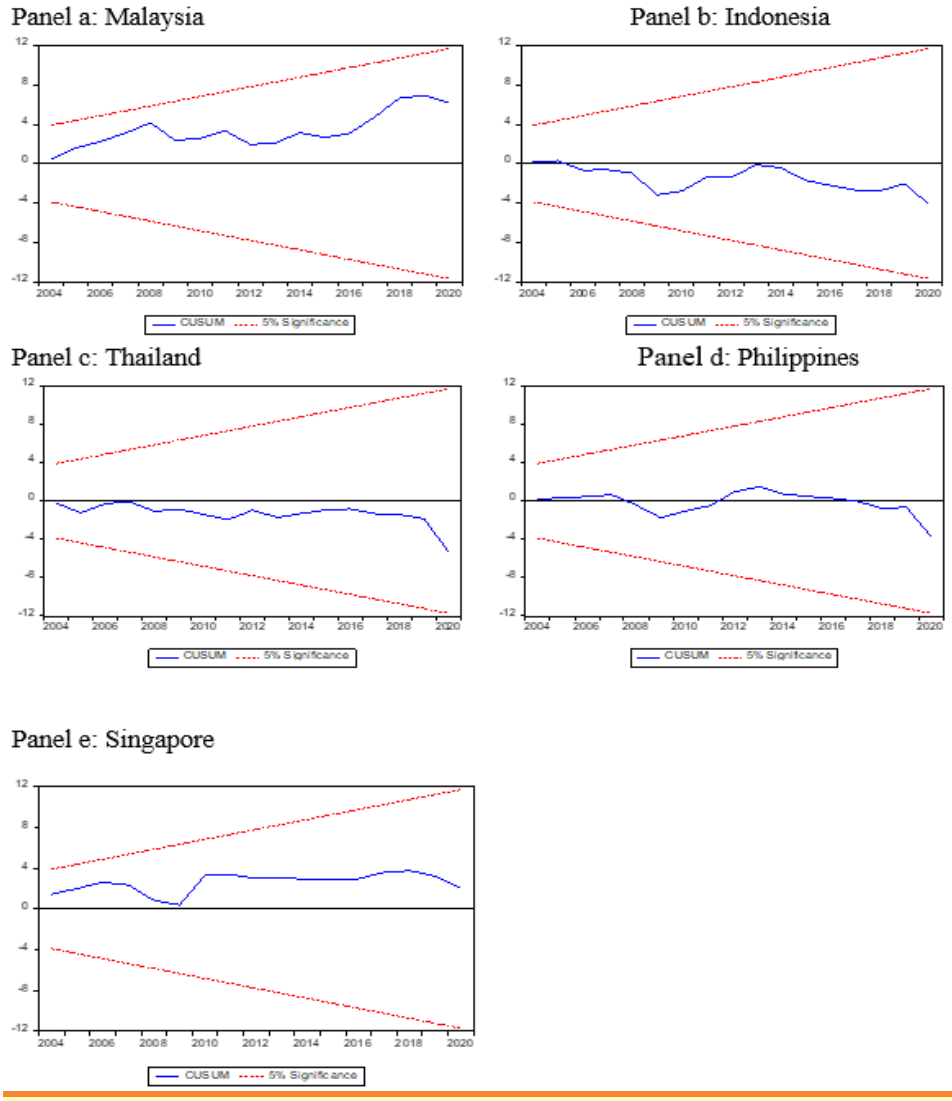

Figure 3 CUSUM Stability Test

6. CONCLUSION

This study contributes to new knowledge regarding the impact of ESG on economic growth in ASEAN-5 countries. First, the empirical results have shown that

ESG has mixed results on the impact on the economic growth in ASEAN-5 countries influenced by the level of government support for ESG practices or the level of awareness and understanding of ESG practices among businesses and investors. Some results showed a significant positive impact of ESG practices on economic growth, while others showed no significant or negative impact. The mixed results can be attributed to factors such as country practices, regulations, and ecosystems to support ESG. Some ASEAN countries may have more advanced ESG frameworks and policies, while others may still need to. As a result, the impact of ESG on economic growth may vary depending on the country's level of implementation. This is in line with the previous studies done by Madison and Schiehll (2021); Minkkinen et al. (2022).

Second, the results indicate that other variables such as labor, capital formation, trade openness, and population may have a greater impact on economic growth than ESG. For example, factors such as technological progress, infrastructure development, and political stability may have a more significant influence on economic growth in certain countries or contexts. Therefore, the impact of ESG on economic growth needs to be evaluated in conjunction with other economic factors to get a more comprehensive understanding of the relationship between ESG and economic growth in the ASEAN-5 region.

Third, the results show that the pandemic has had a negative and significant impact on the economic growth of Singapore and Thailand. On the other hand, surprisingly, the impact of pandemic uncertainty on the economic growth of Malaysia, Indonesia, and the Philippines was found to be insignificant. The possible explanation is that the fight against pandemics slows production recovery in many industries and raises preventative expenses, as well as the circular flow of money. Besides that, longer mobility restrictions will result in economic scarring, making it more difficult for the economy to recover. Lastly, the overall demand fell due to lower consumer spending, mobility constraints, and weaker demand from outside countries.

Therefore, policymakers, institutional investors, and regulators should play vital roles in assisting the Government in supporting ESG practices among business companies by creating a sustainable ecosystem. Over the past decade, the Government has adopted various sustainability programs and incentives, such as tax incentives for companies that prioritize ESG factors, introducing regulations requiring companies to report on their ESG practices, and investing in research and development to promote innovation in sustainable practices. A precautionary policy should be made to support firms in shock. The proposed policies should include the financial assistance to companies, such as low-interest loans, grants, and tax relief. In addition, the policies should also focus on improving the resilience of firms by promoting the adoption of ESG practices.

CONFLICT OF INTERESTS

None.

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