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Interaction of Climate Change and Green Stocks on Economic Growth in ASEAN-5

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ABSTRACT

Research Originality: This study presents a new interaction of climate change in moderating the effect of green stocks, exchange rates, and net exports on economic growth in ASEAN-5 countries.

Research Objectives: This study aims to analyze the interaction of climate change on green stocks, exchange rates, and net exports on economic growth in ASEAN-5 countries.

Research Methods: This study used quarterly panel data from ASEAN-5 countries, 2016-2022, and selected a fixed effects model as the best model. The moderated regression analysis (MRA) approach supports this research.

Empirical Results: The results showed that green stocks, exchange rates, and net exports positively affect economic growth in ASEAN-5 countries. The interaction of climate change on green stocks and exchange rates has a negative effect on economic growth. However, the interaction of climate change on net exports positively affects economic growth in ASEAN-5 countries. It represents that climate change can weaken the effect of green stocks and exchange rates on economic growth. Meanwhile, climate change can strengthen the effect of net exports on economic growth in ASEAN-5 countries.

Implications: This study implies that the government needs to increase investment in green stocks to support financing that can mitigate climate change and develop net exports to increase economic growth toward a green economy.

Keywords:

green stocks; exchange rate; net exports; climate change; economic growth

How to Cite:

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INTRODUCTION

Economic growth is considered an indicator that can measure the success of a country's development. The indicator measures how much people's economic activity creates income in a certain period (Hanifah, 2022). The capital induces economic growth by facilitating resources for increased productivity. The development of technology and information can also increase productivity, thus allowing the world economy to enter the era of globalization (Pradhan et al., 2017). The significant decline in economic growth due to the pandemic positively impacts the digital economy in Southeast Asia. Changes can also influence economic growth in each country in terms of natural conditions (Ottmar et al., 2014). As the cycle of economic growth and technological advancement improves living standards, the demand for natural resources and energy increases. However, as long as energy comes from fossil fuels that produce carbon emissions, the concentration of carbon dioxide in the atmosphere and other greenhouse gases will increase, and climate damage will worsen (Rezai et al., 2018).

Each ASEAN country carries out many economic activities to increase economic growth. The start of economic activity, in the form of investment, is an essential supporting factor in improving the production process (Skärin et al., 2022). Investment is also an aspect to encourage long-term economic growth (Aničić et al., 2020). As part of the capital market, the stock market mobilizes funds to meet the private sector's investment needs. It helps countries achieve the Sustainable Development Goals by 2030.

This research focuses on these 5 ASEAN countries because they have a stock index that includes green stocks from environmentally friendly publicly listed companies and are among the best-performing stocks amid the global crisis (CNBC Indonesia, 2021). The five ASEAN countries (Indonesia, Thailand, Vietnam, Singapore, and Malaysia) have rapidly growing ESG (environmental, Social, and Good Governance) based green stocks that affect economic growth in ASEAN-5 countries. Many foreign investors have invested significant amounts in companies in ASEAN-5 countries. It integrates the world's capital markets so that these activities can increase economic growth. Figure 1 shows the economic growth in ASEAN-5 countries from 2011 to 2022.

Based on Figure 1, economic growth is one of the crucial indicators that every country should consider (Zhu et al., 2022). The highest peak of economic growth was in 2012, and the trend of economic growth decreased the following year. Based on World Bank data, ASEAN-5's economic growth experienced a fluctuating trend from 2011 to 2022. The economic growth decreased due to significant climate change and the global crisis due to the COVID-19 pandemic in 2020, resulting in negative economic growth of -3.3 % (Asian Development Bank, 2020). In Figure 1, it can be seen that the five ASEAN countries experienced a drastic economic decline to minus. Climate change also seriously affects ASEAN's economic growth (Naeem et al., 2021).

Climate change occurs due to increased carbon dioxide (Co2), disrupting economic activity (Singh et al., 2023). Developing countries are more vulnerable to the impacts of climate change due to the shifting role of agriculture and natural resources in the

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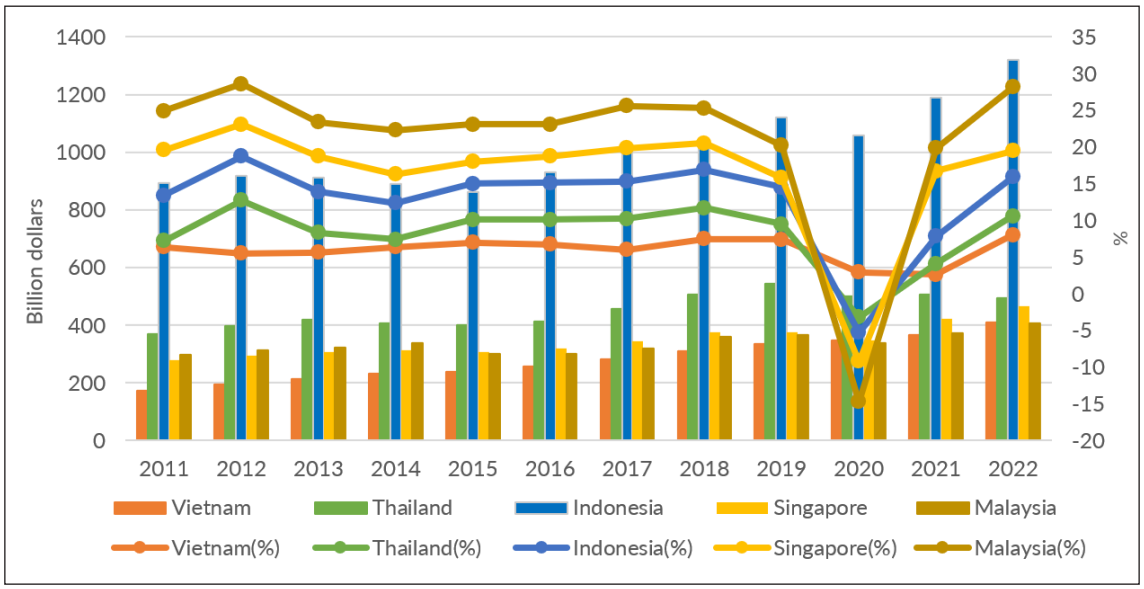
economy (Sakuntala et al., 2022). Economic growth in ASEAN-5 countries can increase with good capitalization amid unstable natural conditions. Capitalization is obtained through green stock markets that encourage a low-carbon economy. However, government efforts to encourage the development of green industries through green investment in ASEAN-5 countries are working. The main barrier to green investment is the high cost of financing to develop the industry (Suriani et al., 2023). Several aspects become obstacles to implementing the green industry, including the domestic industry, which still needs to catch up in research and technology, and the machines used still need to be more efficient, resulting in a lot of waste and high pollution. Costly financing is needed to transition to green industry development; limited human resources and green industry incentives are needed. Transitioning to a low-carbon economy requires significant financial funding to several environmentally friendly sectors. As a result, climate change can directly affect the stock price indices of ASEAN-5 countries in the long run.

Figure 1. Gross Domestic Product (in Billion Dollars) and GDP Growth (in %) of ASEAN-5 Countries for the Period 2011-2022



The Paris Agreement in December 2015 committed governments worldwide to work together to preserve and protect the earth from the catastrophic impacts of climate change (Kussul et al., 2020). Developing countries are more vulnerable to the impacts of climate change due to the shifting role of agriculture and natural resources in the economy (Sakuntala et al., 2022). Over decades, ongoing climate change will decrease profitability and investment enough to reduce output to sustainable levels where emissions and climate change stabilize (Rezai et al., 2018). Based on the ASEAN-5 stock exchanges, the development of green stocks in these five ASEAN countries has increased significantly. Green stocks have an average increase in shares in 2021. Climate change is highest in 2019 in all five ASEAN countries. The development of green stocks has been able to catch up with each country's composite stock price index. Climate change has evidence

of unidirectional causality, from economic growth to renewable energy consumption in the short term (Kalkuhl & Wenz, 2020).

However, the performance of the green stock index shows a trend of high volatility. According to Chen (2012), low-carbon economic transformation can be realized through the green economy. The key to achieving a low-carbon economy is using every transaction with green finance (Otek Ntsama et al., 2021). Some of these events explain that green assets are also sensitive to shocks from abroad and within the country (Pauliuk & Müller, 2014). Empirical results from mentioned that the volatility of stock price indices in emerging markets is higher than in more developed markets. It suggests that green stocks can increase productivity, efficiency, and innovation across all sectors of the economy (Sakuntala et al., 2022).

It is not only investment in the form of stocks that can affect the economic growth of ASEAN-5 countries. Exchange rate movements can also affect economic growth (Mahmoodi & Mahmoodi, 2016). Exchange rates are important for economic growth but depend on the country's economic development level (Obansa et al., 2013). A strengthening exchange rate indicates that performance in the money market is improving. Fluctuations in the exchange rate affect foreign investment, the amount of imports and exports, and the ability to repay foreign debt. Exchange rate movements also influence the increase in people's purchasing power and employment (Suriani et al., 2021). If the exchange rate weakens, it will increase the price of goods, so purchasing power and unemployment will decrease (Hien et al., 2020).

This exchange rate instability will result in lower economic growth (Olamide et al., 2022). Meanwhile, for industrialized countries with complete markets and more stable financial markets, real and financial shocks can be better managed so that economic growth rates are less dependent on the choice of exchange rate regime (AbuDalu, 2014). However, a more flexible exchange rate regime may allow the economy to make the necessary adjustments more quickly. On the other hand, a more flexible regime is weakly associated with slightly higher growth rates (Ilzetzki et al., 2021). Therefore, exchange rate movements play an essential role in describing the economic conditions of each ASEAN-5 country. It also makes economic growth unstable to minus in 2020. Therefore, it is necessary to intervene so that economic activity can increase economic growth in the five ASEAN countries.

Economic growth can be increased through trade between countries. ASEAN-5 countries a country that adheres to an open economy system (Keiko Hubbansyah & Wurdaningsih, 2019). Conduct trade activities between countries to meet their needs. Net exports are a measure of the achievement of effective trade. Changes in the value of net exports also impact economic growth (Pangestin et al., 2021). Economic activities in international trade are carried out to improve the economy. Each country needs and complements each other. Moreover, the ASEAN-5 countries have cooperated closely since 1967, when the Bangkok Declaration was authorized. This cooperative relationship is carried out in various forms, including trade between ASEAN-5 countries. International trade assessed by net exports continues to experience significant ups and

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downs, so any increase in the value of net exports can increase economic growth (Arteaga et al., 2020).

Import-export activities in ASEAN-5 countries have increased and decreased. In 2020, the value of net exports experienced a significant decline due to the global crisis. During the crisis, the purchasing power of European countries and the United States, the main export destinations for ASEAN-5 member countries, generally decreased. When a crisis occurs, to reduce losses on the trade balance, it is necessary to diversify export products and destination countries (Amir et al., 2020). Increased geographical spread intensity and frequency due to extreme weather conditions (Hochman et al., 2022). This climate change risks international trade, such as infrastructure and transportation. These climate changes originate outside the economic and financial system but impact the smooth flow of trade (Singh et al., 2023). Reducing climate change risk is hampered by the need for large capital costs in the renewable energy economy (Liu & Lai, 2021). The cost of capital is obtained from green stocks whose investment activities provide opportunities to promote sustainable economic growth. In addition, the exchange rate and international trade, as seen from net exports, have decreased in 2020 and are very low compared to countries worldwide.

The problems of economic growth in ASEAN-5 can be seen from the problems that occur at this time and the results of several previous studies discuss about climate change like Hardi et al. (2023) through greenhouse studies with FMOLS modeling and DOLS. Research by Nasir et al. (2019) shows the results of economic growth, financial development and FDI lead to increased environmental degradation. While research Sakuntala et al. (2022), monetary policy and global uncertainty affect green stocks using the ADRL model. Research by Ntsama et al. (2021), Ning et al. (2023), Naeem et al. (2021), and Zhao et al. (2022) analyzes the various climate change challenges that can be addressed through green bond financing. Research Martini (2021), The lack of a globally accepted taxonomy of a sustainable economy has led to a decline in green investment. Furthermore, research Abudalu (2014) and Zhu et al. (2022) stated that the exchange rate and net exports affect economic growth. In addition, to the best of the researchers' knowledge, none of the previous studies found climate change as a moderating influence of green stocks, exchange rates, and net exports on economic growth in ASEAN-5 countries, using panel data regression with moderation models. Therefore, this study has a novelty that aims to fill the gap in the previous literature and wants to prove how much influence green stocks, exchange rates, and net exports have on economic growth in ASEAN-5 countries with green stocks.

Based on the description of these problems, it can be concluded that research that combines green stocks, exchange rates, net exports, and climate change has never been conducted. Climate change can disrupt the balance of the economy. There is a need for new policies in the economy so that economic growth does not decline dramatically due to natural factors. Technological development can open up investment opportunities to encourage sustainable economic growth through green stocks, exchange rates, and net exports. It is urgent to research what policies are appropriate to suppress the interaction of climate change impacts on the influence of green stocks, exchange rates, and net exports

on economic growth. This research wants to prove empirically that green investment through green stocks has a crucial role in developing environmentally friendly technology to increase sustainable economic growth and prevent environmental damage.

METHODS

This research uses quantitative analysis with secondary data from quarterly and panel data from five ASEAN countries from 2016-2022. The data used secondary data from each country's World Bank and the Stock Exchange. Stock data for Indonesia (SRI-KEHATI Index), Thailand (SETI Index), Vietnam (VNSI Index), Singapore (iEdge SG ESG Leaders Index), and Malaysia (FTSE4 good Index).

The scope of this study includes the dependent variable, economic growth, while the independent variables consist of green stocks, exchange rates, and net exports. The relationship between the independent and dependent variables is moderated by climate change. Climate change can lead to climate variability, where significant variations in weather variables and their frequency impact economic growth. This is why researchers chose climate change variables as interventions in this study. Climate change is proxied to carbon emissions. Indonesia, Thailand, Vietnam, Singapore, and Malaysia are the five ASEAN countries that are the object of research because these five countries have growing green stocks and are based on ESG (Environment, Social, and Good governance).

The data analysis method in the research is the data regression analysis method. Data regression on regression techniques that use each panel data. The purpose of panel data analysis is to identify differences in characteristics between individuals in several periods studied (Zhao et al., 2017). The advantage of panel data regression is that the results are better than regressions using cross-intercept or time series data (Kim et al., 2016). The regression model equation (see equation 1) can be formulated in the following model:

$$Y_{it} = \alpha_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it} \quad (1)$$

To explain the variables to be studied, it can be written as follows:

$$GDP_{it} = \alpha_0 + \beta_1 \log(GS)_{it} + \beta_2 ER_{it} + \beta_3 NE_{it} \ \varepsilon_{it} \quad (2)$$

Where *GDP* is the value of gross domestic product, *GS* is the value of green stock, ER is the value of the exchange rate, NE is the value of net export, β_1 is constant; ε_t is Error Correction Term.

The data in this study, green stocks, are converted in logarithm form to interpret the parameters appropriately. The use of logarithms in this study is to reduce excessive data fluctuations when analyzing and using panel data regression, the first step is to determine which model is best for the data analysis. The best model selection in the panel data regression test consists of three elections.

The interaction test, also called Moderated Regression Analysis (MRA), is a unique application of linear multiple regression where the regression equation contains an element of interaction (multiplication of two or more independent variables). Moderating variables affect the direct relationship between the independent and dependent variables (Namazi &

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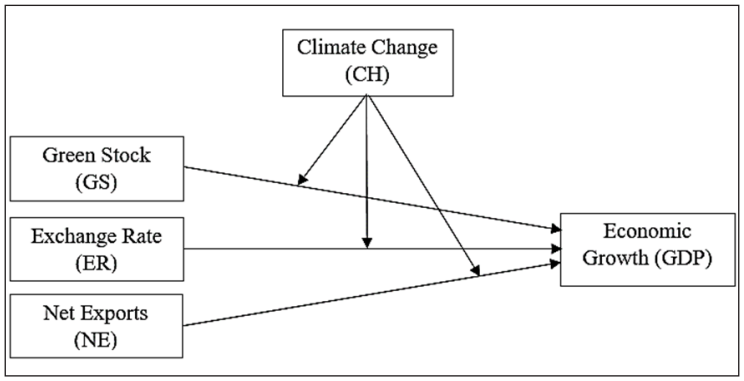
Namazi, 2016). This influence can strengthen or weaken the direct relationship between the independent and dependent variables. Moderating variables can also cause the nature or relationship between the independent and dependent variables to be positive or negative. The research framework for discussing the moderation effect is as follows:

Figure 2. Research Framework



Similarly, the consistency of intervention effects across subgroups supports generalizing interventions as to whether these moderating variables can strengthen or weaken the interaction between the independent and dependent variables in a study. However, the statistical visualization differs from how it is conceptualized in the model graphically as it includes interaction terms depicted by X*Z (Katircioğlu & Taşpinar, 2017).

The following is a moderation model equation that will be used in the panel data regression approach with the equation that is:

$$Y_{it} = \alpha_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 X_{it} * Z_{it} + \varepsilon_{it} \quad (3)$$

To explain the variables of economic growth, green stocks, exchange rate, and net exports moderated by climate change (Equation 3) in this study as follows:

$$GDP_{it} = \alpha_0 + \beta_1 GS_{it} + \beta_2 ER_{it} + \beta_3 NE_{it} + \beta_4 CH_{it} + \beta_5 CH * GS_{it} + \beta_6 CH * ER_{it} + \beta_7 CH * NE_{it} + \varepsilon_{it} \quad (4)$$

A classic assumption test is needed to get consistent estimation results. A regression model is usually called a perfect model if it has a model that can meet a BLUE (Best Linear Estimator) criterion. To achieve these criteria, it must fulfill each Classical Assumption test.

RESULTS AND DISCUSSION

The results of this study are based on data analysis carried out using panel data regression analysis methods and interaction tests. Partial research results show that green stocks, exchange rates, and net exports positively and significantly affect economic growth in ASEAN-5. The climate change interaction test results on green stocks and exchange rates negatively and significantly affect economic growth in ASEAN-5 countries. Meanwhile, the climate change interaction test on net exports has a positive and significant effect on economic growth in ASEAN-5 countries.

The results of this study show that climate change has a major impact on the economy. It is important to reduce the impact of climate change with effective financing so that natural factors cannot disrupt the balance of the economy. Climate change adaptation is inevitable, especially in developing countries where the adaptation deficit is often larger than in developed countries. Reducing the impact of climate change damages on financial asset prices and financial positions can stabilize exchange rates and add value to net exports through a sustainable economy. Sustainable economic growth is costly to finance, so green equity investment can help with government spending. Therefore, there is a need for new economic policies so that economic growth does not decline dramatically due to natural factors. The following are some of the testing stages in this study.

Descriptive statistics are used to explain or present an overview of the characteristics of a series of data without drawing general conclusions. Descriptive statistics are only related to describing or providing information about data and the state of the phenomenon; in other words, they only see an overview of the data obtained. Descriptive statistics in this study are present in the form of average, middle data, maximum data, minimum data, standard deviation, and number of observations for each variable. This study uses real GDP variables, green stocks, exchange rates, net exports, and climate change. This study uses data from 2016-2022 in quarterly form. The following are the results of descriptive statistical tests in Table 1 for this study.

Table 1. Descriptive Statistics

	Log(GDP)	GS	ER	NE	CH
Mean	132.3154	856.5092	7445.837	86.01700	69.03464
Median	100.3684	830.2600	32.88000	71.18500	63.83000
Maximum	342.1875	1776.260	23855.00	222.9820	152.0185
Minimum	64.27500	284.8700	1.310700	41.22531	9.814453
Std. Dev.	74.44062	445.6413	9561.105	44.95216	40.48040
Observations	140	140	140	140	140

Based on Table 1, the results of descriptive statistics show that the amount of data used in this study with each variable amounted to 140 observations. The descriptive statistical analysis results mean (average) economic growth using real GDP per quarter of 132,315 billion. The results of descriptive statistical analysis of green stocks in 140 data samples. Green stocks have an average data value (mean) of 856,509 points. This green stock was developed to provide additional funds to encourage a sustainable economy—green stocks as green financing to reduce climate change that can worsen economic conditions in ASEAN-5 countries. Exchange rates in the five ASEAN countries have an average of 7445.837 (LCU) per US dollar. According to the data, exchange rates continue to appreciate and depreciate against the US dollar. Exchange rate conditions are very important to pay attention to to stabilize economic growth.

In this study, international trade uses the net export indicator. The high and low amount of net exports depends on the economic needs of a country and the economic

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policies implemented to increase economic growth. Climate change is an unbalanced natural condition due to global warming that occurs. The descriptive statistical analysis results of climate change have an average of 69.0346 thousand metrics per ton. This climate change greatly disrupts any economic activity that runs inefficiently. Therefore, there is a need for green financing to suppress these climate changes so that sustainable economic growth can be achieved. Overall, the standard deviation calculation is smaller than the average data value, indicating that the data is evenly distributed.

The best model selection in panel data is tested with three estimation approaches: the Common Effect Model, Fixed Effect Model, and Random Effect Model. The results of the CEM, FEM, and REM tests to determine the best technique of the three estimates, the Chow test, Hausman test, and Lagrange multiplier test, were conducted.

Table 2. Best Model Test Results

	Test	Prob.	Description
Chow Test	Prob. Cross-section F	0.0000***	Selected FEM
Hausman Test	Prob. Cross-section Random	0.0000***	Selected FEM
Lagrange Multiplier Test	Prob. Breusch-Pagan cross-section	0.0000***	Selected REM

Note: Significance at α 1%(***).

Based on Table 2, the tests carried out include the Chow, Hausman, and Lagrange multiplier tests. The FEM model was selected twice, the REM model was selected only once, and the CEM model was not selected as the best model. Therefore, it can be concluded that the FEM model was chosen as the best model for interpreting panel data regression in this study.

Panel data regression estimation is used to analyze this study and provide information. This panel data regression is conducted to examine 5 ASEAN countries that have green stocks for sustainable economic financing. This study wants to analyze and see the effect of green stocks, exchange rates, and net exports on economic growth in ASEAN-5 countries. The best model selected in Table 2 showed that the Chow Test, Hausman Test, and Lagrange Multiplier Test is the fixed effect model (FEM). Hence, the panel data regression test results are shown in Table 3 and will analysis in this discussion just for the FEM result.

The estimation results in Table 3 show that green stocks positively and significantly influence economic growth in ASEAN-5 countries. Green stocks have a regression coefficient of 11.6911 and a probability of 0.0189 <0.05. This shows that green stocks are essential in increasing economic growth in ASEAN-5 countries. Green stocks are developed to provide additional funds to encourage a sustainable economy. Green stocks are green financing to reduce climate change that can worsen economic conditions in ASEAN-5 countries. This study's results align with Asid et al. (2014) and Martini (2021), which show that investment can increase economic growth.

In addition, Table 3 shows that the exchange rate has a positive and significant effect on economic growth. These results show that the exchange rate increases by 1

LCU per US dollar, which can increase economic growth by 0.0171 billion dollars. A stable exchange rate will increase the economy. In line with research, Abudalu (2014) and Zhu et al. (2022) show that exchange rates can affect the economy. This means that the exchange rate is very influential on economic activity (Olamide et al., 2022).

Table 3. Panel Data Regression Estimation Results

Variable	CEM	FEM	REM
C	92.8551	-125.0795	92.8551
	(0.0093)***	(0.0004)***	(0.0000)***
Log(GS)	-26.9766	11.6911	-26.9766
	(0.0000)***	(0.0189)**	(0.0000)***
ER	-0.0024	0.017055	-0.00243
	(0.0000)***	(0.0000)***	(0.0000)***
NE	0.8481	0.6174	0.8481
	(0.0000)***	(0.0000)***	(0.0000)***
R-Squared	0.920983	0.983937	0.920983
Adj. R-Squared	0.918642	0.983085	0.918642
F-stat	393.3756	1155.076	393.3756

Note: Significance at 1%(***), 5%(**).

Meanwhile, net exports positively and significantly affect economic growth in ASEAN-5 countries. International trade makes countries interact with each other to meet their needs so that these activities can increase economic growth (Seto, 2022). The value of net exports can decrease due to environmental damage, which can impact the economy (Febriyatari et al., 2019). The coefficient of the independent variable partially illustrates a significant effect on the dependent variable. Each variable has an important role in economic growth in each country. Green stocks, exchange rates, and net exports positively and significantly affect economic growth in ASEAN-5 countries.

The result of estimating that green stocks support the theory of economic growth that emphasizes growth theory, which emphasizes increasing technological innovation, is also supported by Nasir et al. (2019) and Pertiwi et al. (2020) explained that foreign investment affects the economy of ASEAN countries. Foreign investment affects the economies of ASEAN countries. The existence of technological innovation technology in the form of a green stock market based on ESG to make companies producing goods and services still pay attention to the economy of ASEAN countries. Companies that produce goods and services still pay attention to environmental balance. Economic growth in ASEAN-5 countries can improve by paying attention to environmental sustainability so that the productivity of natural resources is also not disturbed. If resources do not work efficiently, the economy in ASEAN-5 countries can worsen. ASEAN-5 countries.

This suggests the importance of a sustainable economy in enhancing economic growth. Mitigating climate change requires significant financial resources. Climate change can strain the economy and reduce foreign exchange reserves, especially in developing

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countries. Investments through green stocks can be used to help government finances. In addition, climate change also impacts exchange rates. An economy's vulnerability to climate change reduces investor confidence, leading to a decline in the exchange rate. A country investing in green technology and renewable energy gains a competitive advantage. This can attract foreign investment, strengthen the exchange rate, and increase international trade so that the country's net exports increase.

The interaction test (Moderated Regression Analysis/MRA) was conducted in this study to test and analyze the role of climate change in moderating the effect of green stocks, exchange rates, and net exports on economic growth in ASEAN-5 countries. The effect of climate change can strengthen or weaken the direct relationship between the independent and dependent variables.

The results of the interaction test conducted using climate change as a moderating variable can be seen in Table 4. Partially, the interaction test results show that green stocks (GS), exchange rates (ER), net exports (NE), climate change (CH), the interaction of climate change on green stocks, exchange rates, and net exports have a significant effect on economic growth in ASEAN-5 countries. Climate change as a moderating variable has a coefficient of 1.564 with a probability of 0.00 <0.05, stating that climate change positively and significantly affects economic growth in ASEAN-5. The importance of appropriate policies for more inclusive economic and financial development and sustainable foreign direct investment that does not impact the environment (Nasir et al., 2019)this paper attempts to shed light on the ecological consequences (CO2 emission. Contrary to research, Shahbaz et al. (2018)financial development, economic growth, energy consumption and energy research innovations in influencing CO2 emissions function. In this endeavour, we employ the novel SOR (Shahbaz et al. 2017 showed that economic growth and CO2 emissions have an inverse relationship, validating the environmental Kuznets curve (EKC).

Green stocks have a positive and significant effect on economic growth. Meanwhile, when climate change interacts with green stocks, the coefficient is -77.3574, and the probability is 0.001 <0.05. These results explain that the interaction between climate change and green stocks has a negative and significant effect. This interprets the importance of green financing through green stocks to increase economic growth. Research Pertiwi et al. (2020) state that financial risk reflected in the monetary economy can affect foreign investment in ASEAN countries. Research by Otek et al. (2021), Ning et al. (2023), Naeem et al. (2021), and Zhao et al. (2022) analyzed various climate change challenges that can be addressed through green bond financing.

It is also interpreted that climate change can weaken the effect of green stocks on economic growth. Climate change can disrupt the movement of green stocks, impacting economic growth. Research by Nasir et al. (2019) shows that economic growth, financial development, and FDI lead to increased environmental degradation. In comparison, research by Sakuntala et al. (2022), monetary policy and global uncertainty affect green stocks using the ADRL model. Hammoudeh et al. (2020) examined the time-varying causal relationship between green financing and conventional US financing, showing the critical role of green financing for the environment.

Table 4. Interaction Test Results (MRA)

Variable	coefficient	std. Error	t-Statistics	Prob.
C	215.8756	93.29414	2.313924	0.0223**
Log(GS)	71.82542	23.45886	3.061761	0.0027***
ER	0.017231	0.002783	6.191697	0.0000***
NE	0.185390	0.058040	3.194208	0.0018***
CH	1.564014	0.303384	5.155234	0.0000***
Log(CH*GS)	-77.35742	22.90375	-3.377499	0.0010***
CH*ER	-8.270555	1.720555	-4.801542	0.0000***
CH*NE	0.014659	0.001171	12.52020	0.0000***

Note: Significance at 1%(***), 5%(**).

Furthermore, in this estimation, the exchange rate has a significant positive effect on economic growth. In line with Research, Yensu et al. (2022) found a causal relationship between exchange rates and economic growth in nine European countries. When there is a moderating variable of climate change, the exchange rate has a negative and significant effect. This means that the moderating variable of climate change weakens the effect of exchange rates on economic growth in ASEAN-5. The emergence of climate change will cause exchange rates in the five ASEAN countries to weaken due to a decrease in currency value.

This condition will worsen the economy in ASEAN-5 countries. Research by Ribeiro et al. (2020) found that the causality relationship between exchange rates and economic growth is opposite or negative. If there is a disturbance from the environment, it will also impact the exchange rate's stability. The results of the interaction test in Table 4 show that net exports have a positive and significant effect. When there is an interaction between climate change and net exports, the coefficient is 0.01465, and the probability is 0.00 <0.005.

The interaction between climate change and net exports interprets that climate change can strengthen the effect of net exports on economic growth. Increased economic growth occurs during climate change because the international trade process increases (Arteaga et al., 2020). When each country tries to suppress climate change but must meet the survival needs, countries that do not supply raw materials due to extreme climate change will have international trade to increase the value of net exports (Dritsaki & Stiakakis, 2014). When net exports increase, ASEAN-5 countries' economic growth continues to increase. Trade positively impacts economic growth in developed and developing countries (Were, 2015). Research results Shahbaz et al. (2013) showed that the South African economy can maintain economic growth by controlling the environment from damage through efficient energy use. Therefore, climate change is very disruptive to the economic system.

The results of this study are based on data analysis that has been carried out using panel data regression analysis methods and interaction tests. Each variable interacts with

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each other so that the growth of non-performing loans can be controlled. This represents the ability of investors to invest their capital through the capital market, which is not only influenced by the global crisis. Climate change in the environment also affects the stock market in ASEAN-5 countries (Oloko et al., 2022). These changes stem from rising temperatures and greenhouse gas emissions, leading to rising sea levels (Perry, 2016). Exchange rates and net exports can also affect the economy (Aminda et al., 2023) If the exchange rate and net exports are disturbed by environmental factors, this can have a major impact on climate change, which influences and contributes to economic growth. Addressing climate change issues through green innovation and investment can improve the competitiveness of net exports, while a stable exchange rate will support trade sector growth. Integrated and sustainable policies are essential to maximize the potential for sustainable economic growth.

The results of this study's partial estimation and interaction test show that green stocks, exchange rates, and net exports positively and significantly affect economic growth in ASEAN-5 countries. The results of the interaction effect (moderation) of climate change on green stocks, exchange rates, and net exports also significantly affect economic growth in ASEAN-5 countries. The climate change condition causes the independent variable's role to weaken its influence on the dependent variable. Climate change is a major problem in the balance of environmental ecosystems that can affect economic growth in each country.

CONCLUSION

Based on the research conducted to determine the interaction of climate change on the effect of green stocks, exchange rates, and net exports on economic growth in ASEAN-5. Partial results showed that green stocks, exchange rates, and net exports positively and significantly affect economic growth in ASEAN-5. The climate change moderation test results on green stocks and exchange rates have a negative and significant effect on economic growth in ASEAN-5 countries. This indicates that the role of climate change can weaken the interaction relationship between green stocks and exchange rates on economic growth in ASEAN-5 countries. Meanwhile, the moderation test of climate change on net exports has a positive and significant effect on economic growth in ASEAN-5 countries. It shows that the role of climate change can strengthen the interaction relationship between net exports and economic growth in ASEAN-5 countries.

The conclusion from this study's results states that climate change's role is very influential on economic growth. Climate change can trigger innovation and investment in environmentally friendly technology to improve the economy. The existence of financing through investment in green stocks as sustainability in ESG-based economic activities. In addition, there is support from exchange rates and net exports that can quickly increase economic growth in ASEAN-5. However, it is important to remember that the negative impacts of climate change can also threaten economic stability, so effective mitigation and adaptation measures are necessary to maximize the potential for future economic growth. Every company should adopt sustainable practices to reduce energy costs and

improve efficiency. In addition, awareness of the impacts of climate change encourages governments and the private sector to invest in green infrastructure, create new jobs and improve economic competitiveness.

As a stock market monitor, the ASEAN-5 stock exchange market should focus on and enhance green stocks' development to create a sustainable economy. An economy that prioritizes environmental sustainability. As monetary policy controllers, central banks must be wise in making decisions to control exchange rate stability. Also, governments of ASEAN-5 countries must be able to maintain macroeconomic flexibility such as investment, exchange rates, net exports, and climate change, which are very important in resisting external and internal shocks in the economy. Policy recommendations for the government can strengthen nationally determined contribution (NDC) targets to align with the Paris Agreement, ecosystem restoration, and green infrastructure development so that climate change cannot disrupt the balance of the economy.

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