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ASEAN Economy: A Study of Climate Change and Foreign Trade

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Abstract

The present study aims to examine the causal impact of foreign trade of ASEAN economies on climate change. The study based on secondary data covers 20 yearsi.e 2000-2020. In this study,the Ordinary Least Square(OLS) method has been used. The study used CO_2 and the efficiency of energy used as indicators for climate change. The economic variables used in the study are GDP, FDI, Export, Import, Exchange rate, Inflation, and population. The empirical findings show thatthere is a significant impact on GDP, FDI on climate change while export and import have a negative impact on the efficiency of energy used in ASEAN economies. The result suggests that the positive association of imports and $CO_2$is caused by the comparative cost advantage of products by the host country as compared to another country. Moreover, it is important to use more export environmentally friendly power to maintain a healthy climate.

Keywords:Climate Change, Foreign Trade,GDP, FDI,OLS,ASEAN Economies

1.Introduction

The increasing threat of climate change and global warming has been a serious global issue for the past two decades. Long-term variations in temperature and weather systems are referred to as climate change. These activities might be caused by natural factors such as solar cycle oscillations. The burning of fossil fuels like coal, oil, and gas, on the other hand, has been the main contributor to global warming since the 1800s. Fossil fuel emissions act as a blanket over the Earth, trapping the sun's heat and raising temperatures. Carbon dioxide and methane are two examples of greenhouse gas emissions that contribute to climate change. These are produced by, for example, driving a car or heating a building with coal. Carbon dioxide is released when

land and forests are cleared. Methane emissions from landfills are a significant source of pollution. The primary emitters are energy, industry, transportation, buildings, agriculture, and land use.

The goal of the 1997 Kyoto Protocol was to reduce greenhouse gases (GHGs) that cause climate change. Between 2008 and 2012, it was suggested that GHG emissions be reduced by 5.2 percent compared to 1990 levels. Carbon dioxide (CO_2) is one of the numerous environmental pollutants that contribute to climate change, accounting for 58.8percent of GHGs. Energy efficiency is the notion of maximizing economic output per unit of energy spent by measuring energy productivity as the inverse of energy intensity. It has the potential to minimize import reliance while also reducing emissions. It cuts energy use without sacrificing customer convenience or a country's energy competitiveness.

Foreign Direct Investment (FDI) inflows surged dramatically in practically every area of the world throughout the late 1980s and 1990s, reigniting a lengthy and bitter debate regarding the costs and benefits of FDI inflows. Capital, expertise and technology transfer, market access, and export promotion are all advantages of FDI to the receiving host nation. In the context of India, this study addresses the two most major advantages and costs of foreign direct investment: GDP growth and environmental damage.Some filthy businesses pollute the air (cement, fuel, wood, and transportation), while others pollute the water (chemicals, paper, and pulp), and a few pollute both (such as metals).Combining air and water pollution emissions to get at an aggregate measure of pollution emission or degradation of a country's environmental quality, and then relating that measure to FDI inflow, is not particularly useful from a conceptual standpoint. Second, there are local and global contaminants, even in the case of air pollution. Three primary local air pollutants, SO_2, CO, and NOX, exist, whereas CO_2 is the most significant worldwide pollutant.

ASEAN is a group of ten member nations Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. It was founded in 1967 to encourage cultural development and social structures in the region while also facilitating trade and economic progress Aaron O'Neill (2020). As of 2020, ASEAN countries have a population of over 622 million people, out of a total of 7.9 billion people of the world. The region has one of the world's greatest economies, and it is expected to be the fourth-largest by 2050. The region is

over 1.7 million square miles in size. Foreign direct investment (FDI) inflows into ASEAN reached a new high of US$ 182 billion in 2019, making it the world's largest recipient of FDI. FDI fell to US$ 137 billion in 2020 as a result of the unprecedented effect of the COVID-19 pandemic; however, ASEAN fared much better than the rest of the world, with its share of global FDI rising from 11.9 percent in 2019 to 13.7 percent in 2020. The effect of the pandemic on FDI in other sectors was mitigated by FDI in the digital economy and infrastructure-related businesses. Investment within the region has remained resilient, increasing by 5 percent to $23 billion in 2020, bringing the intra-ASEAN share of FDI in the region from 12 percent to 17 percent.

2.Literature Review

2.1Climate Change and Economy

The association between climate change and economic features has been studied in several event studies. Merican et al. (2007) used an autoregressive distributed lag method to investigate the long-run relationship between FDI and CO_2 emissions in five ASEAN countries. According to their findings, FDI increased emissions in Malaysia, Thailand, and the Philippines, but had an adverse connection with CO_2 emissions in Indonesia and Singapore. Baek (2016) used the pooled mean group parameter estimates of dynamic panels in five ASEAN countries to evaluate the influence of FDI inflows, income, and energy usage on CO_2 emissions, and found that FDI enhanced CO_2 emissions.

Using a multi-variate Granger causality approach, Pao and Tsai (2011) evaluated the causal linkages between CO_2 emissions, energy consumption, FDI, and GDP in the BRIC (Brazil, Russian Federation, India, and China) nations. Their findings revealed a one-way causality from GDP to FDI as well as a bi-directional causality between CO_2 emissions and FDI. From 1980 to 2013, Kim looked at the short-run cause and effect and long-run equilibrium between CO_2 emissions, energy consumption, GDP, and inward FDI in 57 developing nations. Geographic data were analyzed after the evaluation for all developing countries was concluded. In the short run, no causalities between FDI and CO_2 emissions were noted for all emerging regions, which was also proved by regional evaluations.

Furthermore, several researchers have looked into the relationship between energy use and economic growth (Shiu and Lam, 2004; Jumbe, 2004; Yoo, 2005; Chen et al., 2007; Mozumder and Marathe, 2007; Apergis and Payne, 2009). According to Ozturk (2010), this association has a significant influence on energy policy classifications. The causal relationship between energy use and economic growth, as well as the significant correlation between GHG emissions and economic growth, has been thoroughly examined in a number of researches. The dynamic clear correlation has been studied extensively (Halicioglu, 2008; Zhang and Cheng, 2009; Apergis and Payne, 2009; Soytas and Sari, 2009; Pao and Tsai, 2010; Arouri et al., 2012), with the findings varying depending on the target nations. Long-run relationships between CO_2 emissions, energy consumption, GDP, and FDI have been modeled by Jalil and Mahmud (2009); Pao and Tsai (2011); Kivyiro and Arminen (2014); Baek (2016).

2.2 Foreign Trade and Economy

Weber et. al. (2008) analyzed the impact of foreign trade through export on climate change by applying environmental input-output analysis. During the study period 2002-2005, the finding suggests that almost 33 percent of Chinese emissions valued 1700Mt CO_2 from its export, and production improved from 12 percent worth 230 Mt in 1987 to 21 percent value760 Mt in 2002, and these emissions are majorly contributed by carbon leakage. Muhammad et.al (2019) analyzed the impact of bilateral FDI, CO_2 emission, energy use, and capital importance in economic development. The study adopted secondary data covering the period 2001-2012 in Asia for 34 hosts and 115 sources countries. The study applied OLS and GMM regression. The empirical findings suggest that all variables play a decisive role in shaping the economic growth of Asia countries.

Mahmood et al. (2020) used the Environmental Kuznets Curve (EKC) to measure the influence of income, energy usage, trade, and FDI on CO_2 emissions in five major North African economies from 1990 to 2014. Their findings revealed a negative relationship between export and CO_2, as well as a positive impact of imports and trade openness on CO_2 emissions, but no effect of FDI on CO_2.Using a fully modified ordinary least square (FMOLS) model, Al-Mulali et al. (2015) viewed the relationship between energy consumption, trade openness, urban growth, industrial output, and political stability on environmental degradation in the Middle East and North African region from 1996 to 2012. The findings indicate that urban development, energy

consumption, trade openness, and industrial development uplift the changes in environmental harm.

De Vita et al. (2020) use the threshold effect of R&D to analyze the connection between FDI import and energy consumption intensity in 34 OECD countries from 1987 to 2013. They find a significantly positive correlation between FDI inflows to non-primary sectors and R&D, as well as a positive threshold effect of sectoral R&D between FDI inflows to secondary and tertiary sectors and energy intensity.Yunfeng et al. (2010) examined the relationship between foreign trade and its contribution to global warming, with a focus on CO_2 emissions, and discovered that the manufacturing process of exports produces between 10-27 percent of China's annual CO_2, while China's CO_2 imports increased by nearly 5 percent between 1997 and 2007.

2.3 Climate Change and Foreign Trade

For the main economic factors including FDI and GDP, several authors have studied the mutual impact between these variables and climate changes. For instance, Kastratović, R. (2019)Examined the impact of economic profile as measured by FDI and GDP on Greenhouse gases emissions in the agriculture sector of developing countries for the period from 2005 to 2014. The study applied emission intensity to calculate greenhouse gases. The other variable used in the studies isthe share of internet users in the population, and stringency environmental regulation, share of livestock production in agriculture. The empirical findings show that the changes occurred due to agriculture production techniques. This study used the import of capital goods for controlling the model.

M. A. Nasir et al. (2019) examine the relationship between CO_2 emissions, economic expansion, foreign direct investment, and financial development in selected ASEAN countries from 1982 to 2014. Quantitative techniques (OLS, DOLS, and FMOLS) were used to examine the data. Other factors used in the research include the ratio of bank credit to bank deposits, the number of publicly listed firms per 10,000 people, and international debt issued as a percentage of total GDP. According to the analysis, the rise in environmental degradation is solely due to increased FDI and economic growth. Overall, income activity has had a negative impact on the environment.

E. E. O. Opoku et al. (2020)examine the effects of industrial growth and foreign direct investment on the environment (GHG emissions) and climate change from 1980 to 2014. The researchers looked at a number of factors related to CO_2, NO_2, and NH4 emissions. The researchers used the effect pooled mean group method to prove their hypothesis (DOLS, FMOLS). The study results suggest that FDI has a significant impact on the environment, with a negative effect as CO_2 emissions and total greenhouse gas emissions rise. However, the research revealed that the effects of industrial growth on the climate are statistically insignificant in general.

M. B. Jebli et al. (2019) examine the causal linkages between renewable energy consumption, tourist arrivals, trade openness ratio, economic development, foreign direct investment (FDI), and CO_2 emissions using a panel of 22 Central and South American countries from 1995 to 2010. The results reveal that the variables under investigation are co-integrated. Unidirectional causalities between renewable energy, CO_2 emissions, and trade; tourism, trade, and FDI; and economic growth, renewable energy, and tourism are revealed by short-run Granger causality tests. In the long run, renewable energy, tourism, FDI, trade, and emissions all have bidirectional causality.

The relationship between environmental contamination, economic growth, energy use, and foreign direct investment in six Sub-Saharan African countries is examined by M. W. Ssali (2019). According to the analysis, which used an exploratory program with ARDL assessment, there is a significant positive outcome and unidirectional causality from CO_2 to foreign direct investment in the long run, but there is no causal relation in the short run. When energy consumption goes up by 1 percent CO_2 levels rise by 49percent. CO_2 levels rise by 16 percent for every 1 percent increase in economic growth, but CO2 levels fall by 46 percent for every 1percent increase in economic growth squared.Thus, the empirical literature reviewed so far has been summarized in table1.

Table: 1
Summary of Literature Review

Author	Country	Methods	Empirical Results
Wang, Y et.al (2020)	30 provinces in mainland	Construction of spatial weight matrix (GMM)	There is a nonlinear "inverted-U" relationship between FDI and emissions,

	China		
De Vita et.al. (2020)	OECD nations	GMM	A negative relationship between FDI and reduce energy intensity
Opoku, E. E. O., (2020)	6 selected African countries	Pooled Mean Group estimation technique	The findings show that FDI has a negative impact on the environment by increasing CO2 emissions and total GHGs.
Mahmood et. al. (2020)	North Africa	EKC model	A negative effect of export on CO_2 was found
Muhammad et.al. (2019)	Asia	OLS, GMM	The economic growth of Asian nations is influenced by a positive relationship between energy consumption, FDI inflows and outflows, CO2 emissions, and capital.
Kastratović, R (2019)	63 developing countries	GMM	A positive relationship between greenhouse gases and FDI.
Nasir, M. A et.al (2019)	Selected ASEAN countries	DOLS and FMOLS	Overall, economic growth had a negative effects on the natural.
Jebli, M. B.,et.al (2019)	22 Central and South American countries,	FMOLS and DOLS	The findings revealed that increased CO2 emissions were largely due to economic expansion and commerce.
Ssali, M. W (2019)	6 selected sub-Saharan African countries	pooled mean group estimation (ARDL/PMG),	In the long run, there is a largely positive impact of FDI on CO2 while in the short term, there is no causal relationship.
Baek (2016)	ASEAN	Pooled mean group estimator of dynamic panels	The positive relation between FDI and CO2 emission
Apergis, N. (2016).	Data from fifteen	the panel, time-series, and time-varying	The results from time-varying cointegration are in

	countries	approaches of cointegration	favor of time-varying parameters.
Al-Mulali et. al. (2015)	MENA	FMOLS	A positive relationship between the variables and climate change were found except for political stability
Suyi Kim (2013)	57 developing countries	Decomposition Analysis Methodology and Precedent Studies	In the short run, no causalities between FDI and CO2 emissions were found for all developing nations.
Al-mulali, U (2012)	12 Middle Eastern countries	Panel model	The positive relation between economic factors and climate change
Yunfenget.al. (2010)	China	Trade intensity	A positive upliftment in export and import to CO_2 emission
Pao and Tsai (2011)	BRIC	Multi-variate Granger causality approach	bi-directional causality between CO2 emissions and FDI as well as a one-way causality from GDP to FDI.
Joysriacharyya (2009)	India	Cointegration analysis	FDI inflow in India did have a positive, but marginal, long-run impact on GDP growth
Weber et. al. (2008)	China	EIOA	A positive association between Climate change and export
Merican, Y., Yusop (2007)	ASEAN	Autoregressive Distributed lag method	The positive relation between economic factors and climate change in some ASEAN countries.

3.Methodology

3.1 Data Definition and Sources

In this study, we selected ASEAN nations with the largest economies in the ASEAN bloc.The study is based on secondary data covering the period from 2000 to 2020. The availability of World Bank data and well-balanced data for cross-sectional with panel data characteristics is the

primary reason for focusing on these economies. Table 2 shows the measurement, references, and data sources for the study of nine variables.

Table:2
Variable Definition and Sources

Variable	Notation	Reference	Data Source
Dependent Variable			
Climate Changes (CO_2)	CO_2	De Vita et.al. (2020)	WTI
Efficiency of Energy Used	EEU	Opoku, E. E. O., (2020)	WTI
Independent Variable			
Foreign Direct Investment	FDI	Wang, Y et.al (2020)	WTI
Gross Domestic Products	GDP	Pao and Tsai (2011)	WTI
Export	EXT	Weber et. al. (2008)	WTI
Import	IMT	Joysriacharyya (2009)	WTI
Exchange Rate	ER	Merican et al. (2007)	WTI
Inflation	INF	Suyi Kim (2013)	WTI
Population	PLT	Pao and Tsai (2011)	WTI

3.2Cross Section Dependence

Firstly, we attempt to evaluate the cross-sectional dependence among variables by following Pesaran (2004, 2007). To start with the equation as follows:

$$\Delta Y = \pi i\, Yi, t-1 + yiZit \sum_{j-1}^{p-1} \theta ijYi, t-j + Eit$$

Where, Zit is a deterministic component, $\sum_{j-1}^{p-1} \theta ijYi, t-j + Eit$is regarded it as ADF test. Therefore, Eit is cross-sectional for objects i when they share common factors. By defining that, we get:

$E_{it}=\theta_i F_i + U_{it}$

θi refers to every individual has a different influence and Uit regards as no cross-sectional and no autocorrelation.

By embedding equation 2 into 1 we get

$$\Delta Y = \pi i\, Yi, t-1 + yiZit \sum_{j-1}^{p-1} \theta ijYi, t-j + \theta \text{iFi} + \text{Uit}$$

Therefore, following Pearson (2004) to test whether there is an existence of cross-sectional dependence among the variables or not.

3.3 Stationarity Test.

Secondly, we elaborate on the test of stationarity based on Levin et al. (2002), Im et al. (2003), and Pesaran (2007). The general equation built by Levin et al. (2002) test can be specified as follows:

$$\Delta Yit = i-1 + yiZit \sum_{i-1}^{N} tiT(\pi it, \theta 1i, .., \theta ip1)$$

3.3 Regression Estimation

Many previous studies proposed that the presence of co-integration should be referred to the two main methods such as OLS-based estimators — FMOLS (Fully Modified OLS) and DOLS (Dynamics OLS). The main difference between the two approaches is how to correct the autocorrelation in regression. FMOLS allows using Newey-West for correction whereas DOLS accepts adding more lagged and lead variables. Pedroni (1996, 2001) suggested the approach to estimate the coefficients, which is used to measure the long-run effects. The following OLS model has been formulated:

$$CC_{it=}\alpha + \beta_1 FDI_{it} + \beta_2 GDP_{it} + \beta_3 EXT_{it} + \beta_4 IMT_{it} + \beta_5 ER_{it} + \beta_6 INF_{it} + \beta_7 PLT_{it} + \varepsilon_{it} \ldots.(1)$$

$$EEU_{it=}\alpha + \beta_1 FDI_{it} + \beta_2 GDP_{it} + \beta_3 EXT_{it} + \beta_4 IMT_{it} + \beta_5 ER_{it} + \beta_6 INF_{it} + \beta_7 PLT_{it} + \varepsilon_{it} \ldots.(2)$$

4.Result and Discussion

4.1 Descriptive Statistics

Table:3
Descriptive Statistics

Variable	Min.	Max.	Mean	Std. Dev.
Dependent variable: Climate Change				
CO_2	900	583110	95099	131826

EEU	-849	98.92	-64.213	206.23
Independent VARIABLE				
FDI	-2.76	32.17	5.3972	5.9722
GDP	-9.99	14.53	5.2255	3.7641
EXT	.10	228.99	58.2560	52.330
IMT	.06	208.33	54.3621	45.634
ER	1.25	23208	4354.5	6253.8
INF	-22.09	41.51	5.9290	7.8054
PLT	223138	185453064	409607	458729

4.2 Cross Section Dependence Tests

For examining cross-section dependence, the authors used Breusch-Pagan LM, Pesaran, and Frees test. It is seen that all tests fail to reject the null hypothesis of no cross-section dependence. Therefore, we can conclude that there is no cross-section dependence between the variables under study. This finding is of high significance and provides strong evidence that the variables have no long-run relationship.The null hypothesis is that H0: there is no cross-sectional dependence at the level of significance * p-value < 1percent, **p-value < 5percent, and ***p-value < 1percent. The results of cross-section dependence tests are given in table 4.

Table:4
Cross Section Dependence Tests

Test	**Parameter**	**Findings**
Breusch-Pagan LM	13.32	Fail to Reject the Null Hypothesis
Pesaran	1.62	Fail to Reject the Null Hypothesis
Frees Test	0.084	Fail to Reject the Null Hypothesis

4.3 Panel Unit Root Test

The symbols *,**, and *** refer to the level of significance at 10 Percent, 5 Percent, and 1 percent respectively. The assumption of Levin-Lin-Chu unit-root test H_0: panels contain unit root roots and H_1: the panel is stationary. As for Im-Pesaran-Shin unit-root test, the assumption is that H_0: all panels contain unit roots (or all the series are non-stationary), and H_1: some panels

are stationary. Concerning the Pesaran panel unit root test with cross-sectional, the assumption is that H_0: homogeneous non-stationary and H_1: homogeneous stationery. Table 5 presents the empirical results of the unit root test.

Table:5
Unit Root Tests

Variables	Test	Intercept	Intercept and Trends	Summary
CO_2	LLC	-3.453***	-2.343***	Stationary at 1percent level of Significance
	IPS	-4.381***	-1.485***	
	CIPS	-6.163***	-5.893***	
EEU	LLC	-7.665***	-6.473***	Stationary at 1percent level of Significance
	IPS	-5.099***	-6.221***	
	CIPS	-3.624***	-4.598***	
FDI	LLC	-6.341***	-5.382***	Stationary at 1percent level of Significance
	IPS	-5.347***	-2.574***	
	CIPS	-2.390***	-4.342***	
GDP	LLC	-3.584***	-3.224***	Stationary at 1percent level of Significance
	IPS	-6.392***	-5.483***	
	CIPS	-1.509***	-4.385***	
EXT	LLC	-2.485***	-2.485***	Stationary at 1percent level of Significance
	IPS	-1.983***	-6.894***	
	CIPS	-4.121***	-4.857***	
IMT	LLC	-3.875***	-3.857***	Stationary at 1percent level of Significance
	IPS	-5.872***	-4.921***	
	CIPS	-8.411***	-3.572***	
ER	LLC	-7.493***	-4.695***	Stationary at 1percent level of Significance
	IPS	-2.584***	-1.298***	
	CIPS	-4.873***	-3.861***	
INF	LLC	-2.475***	-2.328***	Stationary at 1percent level of Significance
	IPS	-.5.009***	-4.271***	
	CIPS	-1.465***	-2.193***	
PLT	LLC	-1.483***	-6.762***	Stationary at 1percent level of Significance
	IPS	-.7.463***	-1.829***	
	CIPS	-2.346***	-2.385***	

4.3 Regression Analysis

The empirical findings reveal that there is a significant positive relationship between FDI and climate change as measured by CO_2 and the efficiency of energy used (EEU). It means that if there is an increase in FDI by 1 percent, there will be an increase in CO_2 by 2.61 percent and increase the efficiency of energy used by 1.13percent. The study findings are consistent with the

findings ofOpoku, E. E. O., et.al (2020) and Kastratović, R. (2019). The positive association between FDI and climate change implies that the inflow of FDI into the host country leads to an increase in the usage of raw materials which ultimately affects the climate. Moreover, another point is that there is directly increasing carbon emissions and indirectly increasing carbon emissions by enhancing energy intensity are both possible outcomes of FDI (Wang, Y etal, 2020).

The Empirical findings show that there is a positive relationship between GDP and Climate change as measured by CO_2 and the efficiency of energy used. It meansthat, if there is an increase in GDP by 1percent, there will lead to an increase in CO_2 by 1.98 percent, and increase an in inefficiency energy used by 4.61 percent.The result is in line with the findings ofSsali, M. W (2019). Any rise in GDP is attributed to production growth which has a direct link with climate change. Moreover, the analysis shows that there is a positive relationship between Export and Climate change while the findings reveal that there is a negative association between export and Energy Efficiency used (EEU). The empirical finding suggests that an increase of 1 percent of export will lead to an increase of climate change (CO_2) by 3.01 percent and likewise decrease the efficiency of energy (EEU) used by 1.88 percent. Thus, the result is consistent with the finding of Weber (2008), Al-Mulali (2015) Muhammad (2019).

However, the author Mahmood (2020) concludesa negative relationship between export and Energy efficiency used (EEU). The positive association of export and CO_2 (Model one) is mainly due to intense and aggressive production of merchandise goods, which assist in reducing the cost of production and ultimately helps in uplifting export and CO_2 simultaneously, while a negative association between export and energy efficiency used as exporting the energy by the host country reduces the chances of adverse utilization of harmful energy in the host nation and transferring to the other nation. However, it is important to use more export environmentally friendly power to maintain a healthy climate.

The analysis shows that there is a positive and significant association between imports and Climate change. It means that an increase of 1 percent of imports will uplift the CO_2 by 1.89 percent while a negative association between Energy efficiency used (EEU). Findings also suggest that an increase of 1 percent of imports will decrease the energy efficiency (EEU) used by 7.72 percent. The result of the study is consistent with the findings ofMahmood (2020).The

positive association of imports and CO_2 (Model one) is caused by the comparative cost advantage of products by the host country as compared to another country.

Furthermore, it is evident that there is no significant impact of exchange rate and inflation on climate change as measured by CO_2, while there is a negative and significant impact of inflation on the efficiency of energy use. The findings suggest that population has a positive and significant impact on climate change in both measurements. It suggests that the climate would be affected adversely if people won't follow proper measurements while carrying out their activities that affect the climate.The regression results and hypothesis testing for both models using OLS are presented in table 6.

Table:6

Regression Estimation Method: Long-Run Coefficient

Variable	**Model 1 (CO_2)**	**Hypothesis Testing**	**Model 2 (EEU)**	**Hypothesis Testing**
FDI	0.0261	Supported	0.0113	Supported
GDP	0.0198	Supported	0.0461	Supported
EXT	0.0301	Supported	-0.0123	Supported
IMT	0.0188	Supported	-0.7211	Not Supported
ER	0.231	Not Supported	0.9723	Supported
INF	0.586	Not Supported	-0.0232	Not Supported
PLT	0.0152	Supported	0.0481	Supported

Conclusion

The main objective of the study is to analyze the relationship between foreign trade and climate change in ASEAN economies. Climate change is measured by CO_2, and the efficiency of energy used while foreign trade is measured by export and import. The other economic variables used in the study are FDI, and GDP,exchange rate, inflation, and population. For investigating the impact of foreign trade and other economic factors on climate change, the ordinary least square method (OLS) is used. Secondary data is used in the current study for 20 years (2000-2020).

The empirical findings show that foreign trade has a negative impact on climate change. It can be attributed to the fact that there will be a rise in energy used while carrying out trade activities which ultimately raise the level of CO_2. Moreover, the analysis reveals that there is no

impact of import on the efficiency of energy used. Furthermore, The findings show that FDI and GDP have a positive impact on climate change as measured by CO_2 and UUE. The exchange rate has no impact on climate change as suggested by the empirical findings. The analysis demonstrates that inflation has a negative impact on CO_2 but there is no significant relationship with EEU. Finally, the analysis reveals that there is a positive impact of population on climate change.

Despite the fact that climate change is forecasted to rise with income and foreign direct investment, an inverse correlation was noted. This describes why the technique effect of climate change was invalid; consequently, the pollution-reduction impact of energy consumption efficiency can be beneficial when completely separated from economic growth. The study confirms that mitigating climate change necessitates a multifaceted approach; thus, the suggestions are given:

- To reduce emissions, government action toward economic structural change through carbon reduction and energy efficiency is required.
- The government's effort to improve environmental quality requires the substitution of fossil fuels for clean and renewable energy innovations, as well as a diversifying of the energy mix.
- External financing and global collaboration with advanced economies are essential for achieving long-term development objectives.
- Improving institutional quality is an important part of increasing political will lead to combat climate change.

Due to climate change being a localized phenomenon, future studies should aim to assess the scope of the study through a country-specific assessment in order to make effective policy recommendations.

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