

Integrating fiscal matters with environmental sustainability in ASEAN countries role of fiscal deficit interest rate and stock exchange index

by Marlina Widiyanti

Submission date: 05-Nov-2020 02:11PM (UTC+0700)

Submission ID: 1436743168

File name: ole_of_fiscal_deficit_interest_rate_and_stock_exchange_index.pdf (731.76K)

Word count: 6562

Character count: 36515

INTEGRATING FISCAL MATTERS WITH ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES: ROLE OF FISCAL DEFICIT, INTEREST RATE AND STOCK EXCHANGE INDEX

*Marlina Widiyanti¹, Isfenti Sadalia², Andhyka Tyaz Nugraha³

³ ¹Faculty of Economics, University Sriwijaya, Indonesia

³ ²Faculty of Economics and Business, Universitas Sumatera Utara, Medan, Indonesia

³ ³School of Technology Management and Logistics, College of Business, Universiti Utara Malaysia, Malaysia

*E-mail: marlinawidiyanti68@yahoo.co.id (Corresponding Author)

Received 15 November 2019; accepted 25 June 2020; published 30 October 2020

Abstract. The current study was carried out with the objective of evaluating the relationship between environmental sustainability and fiscal deficit, stock exchange index & interest rate. A panel data methodology has been used for the period ranging 1995-2018. The econometric tests of cross-sectional dependence, cointegration, unit root and long run estimations were employed in the study. The estimation of the long run associations has been performed on the basis of the AMG estimations. The AMG estimations showed that interest rate and fiscal deficit have negative relationship with environmental sustainability, whereas increase in the stock exchange index, capitalization of the indexed companies has positive and significant effects on the environmental sustainability. The Konya causality analysis shows that the variables present bidirectional associations. The present study is novel as it is based upon studying the fiscal macroeconomic indicators and their relevance to the environmental sustainability. The novelty and significance of the study is reinforced by the fact that a new dataset has been used. The current study is also important from the regional standpoint as developments are being made in the ASEAN region. The study has some limitations which have been discussed along with the theoretical and policy making implications.

Keywords: AMG, fiscal deficit, stock exchange index, ASEAN.

Reference to this paper should be made as follows: Widiyanti, M., Sadalia, I., & Nugraha, A. T. 2020. Integrating Fiscal Matters with Environmental Sustainability in ASEAN Countries: Role of Fiscal Deficit, Interest Rate and Stock Exchange Index. *Journal of Security and Sustainability Issues*, 10(Oct), 349-359 [https://doi.org/10.9770/jssi.2020.10.Oct\(28\)](https://doi.org/10.9770/jssi.2020.10.Oct(28))

JEL Codes: O1, O53

1 Introduction

The term sustainability implies the ability of anything to exist constantly over long period of time. Environmental sustainability is they can be discussed as the preservation of the environment for a long period of time. The rate at which any country can harvest the renewable resources, the rate at which pollution is increasing in the atmosphere and the rate of depletion of the non-renewable resources are few of the parameter that are used for the calculation of environmental sustainability. In case a country is unable to protect its environmental resources indefinitely than it is not environmentally sustainable. Many countries are working worldwide to improve the sustainability of their environmental resources while keeping up with the increasing development all across the globe. They are shifting towards the renewable energy sources and promoting the trends of recycling and reusing the non-biodegradable products. The ASEAN countries are rich in natural resources and have gained significance globally due to these reservoirs of natural resources (Manzano, 2001; Severino, 2005; López, 2020). Due to the increasing demands of the population and the increased trend of economic growth, the environment of this region is under pressure. Over the recent years the region's economic growth has been very prominent. The rate of growth of ASEAN countries is way greater than the world average. However, the downside of this increased rate of economic growth is that the pressure on the natural resources such as clean land, water and air is increasing drastically. The urbanization of the huge cities such as Manila, Bangkok and Jakarta have been consuming the natural resources from within the country and from across the borders as well. This is very prominent from the example of Indonesia (Chuanrommanee &

Swierczek, 2007; Letchumanan, 2010). The main sources of energy in Indonesia are shown in the following graph (Figure 1).

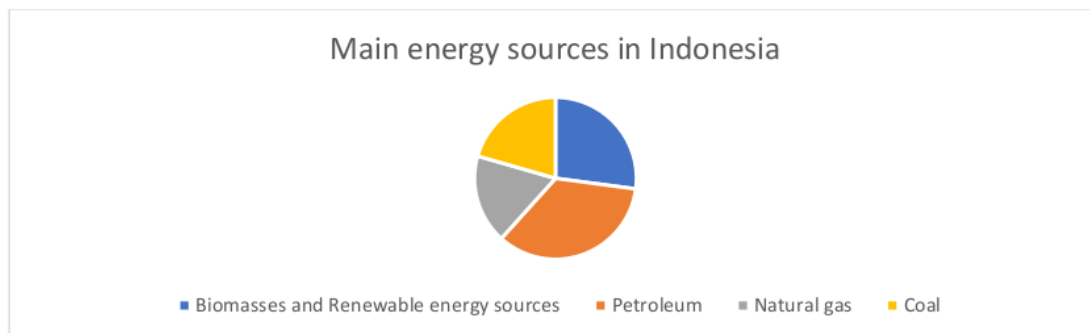


Figure 1: Main Energy Sources

The ASEAN countries are rich in natural resources but are still facing many challenges in keeping a balance between the economic development and the environmental sustainability (Tay, Estanislao, & Soesastro, 2001). The environmental issues corporation was first established by the ASEAN countries in 1997. The main aim was to achieve a sustainable development by promoting the green and clean environment. This can be done by promoting the natural resources (Hussain et al., 2018). The conservation of water, soil, energy, forests, biodiversity, minerals, marine and costal resources has to be monitored constantly (Hussain et al., 2020; Panjaitan et al., 2020; Sugiharti et al., 2020). The preservation of clean drinking water and fresh air are essential for the population to be able to live a healthy life (Yeganeh Kia, 2020; Monni et al., 2018; Moumen et al. 2019). The ASEAN socio cultural community has been aiming towards the creation and implementation of a more environmental friendly technology (Ferguson, 2004; Nguitragool, 2010). The community has been working towards sustainable environmental protection, production and consumption of resources and social development. In order to have sustainable environment, it is critical to find the balance between the economic growth and environmental growth (Gochoco-Bautista & Remolona, 2012). Indonesia has many renewable resources which can be used for the economic development along with the environmental sustainability. They can be seen in the table 1.

Table 1: energy Sources

Renewable Energy Source	Percentage
Hydro	72.7 %
Geothermal	23.22 %
Wind	0 %
Micro Hydro	0.93 %
Mini Hydro	0.51 %
Solar	0.23 %
Waste	0.02 %

Over the years it has been observed that the fiscal policy has a huge impact on the environmental sustainability of any country. The fiscal policy has a major role in the transformation of an economy to become more inclusive and greener. The fiscal policies are able to promote the shift in the production, investment and consumption of resources. The fiscal reforms have been discouraging the activities causing the air pollution and use of limited and non-renewable resources. Many investment opportunities are promoted through the fiscal policies that have a major positive impact on the environment sustainability such as investing in renewable energy sources like solar energy. Such policies are able to drive the investment options and development priorities in the ASEAN countries (Plummer, 2002; Rajan, 2005). The national revenues generated are thus spent on sustainable resources so that the economy is sustained along with the environment. The market growth of sustainable resources can prove to be a

huge benefit for the ASEAN countries. This way the economy will be benefited along with the environment. This paper is focused on the impact of such fiscal policies on the environmental sustainability.

2 Literature Review

In this section of the paper we will analyse the impact of a few fiscal components on the environmental sustainability. The components that are included in this study include fiscal deficit, interest rate and stock exchange index.

2.1. The Relation between Fiscal Deficit and Environmental Sustainability in ASEAN countries

The fiscal deficits can be described as the negative balances that occur due to the excessive spending by the government of any country. During the fiscal year the government of any country has a set amount of funds that can be utilized. The excessive spending due to any reason causes a deficit (Bende & Slater, 2003; Simatupang, 2002). This imbalance is also termed as account deficit. The government borrowing results in increasing national debt. The long term deficits can be very harmful for the economy and stability of the country (Sen, Asher, & Rajan, 2004; Vithayasrichareon, MacGill, & Nakawiro, 2012). The policy analysts and economists argue about the impact of fiscal deficit on the economic and environmental conditions of any country. It is observed that due to the increase in fiscal deficit the result in borrowing from the private sectors, capital structures are manipulated, interest rates are increased, the overall export rate is decreased, the inflation increases and more taxes are implemented (Buracom, 2014). The economists believe that there should be a balance between the deficit and revenue for the sustainable growth of the economy and environment (Sharma, 2014). The economic activities are majorly affected by the fiscal deficits. The businesses are endangered, and the investments are reducing due to increasing fiscal debt. The experts have analysed that if the any country is unable to make up for the increasing fiscal deficits it ends up in a continuous downfall as the deficits keep on accumulating each year. That is the reason they have to be balanced with the budget surplus as soon as possible. The increase in the fiscal deficit has proven to have a negative impact on both economic and environmental sustainability of the country (Anbumozhi & Phoumin, 2015; Bayoumi & Mauro, 2001). Due to the increased financial pressure very few funds are allocated for the sustainable economic activities including the development of renewable energy sources. Most of the activities essential for environmental sustainability require economic funding in order to be successful. This includes various setups for the recycling and reuse of products and researching and development on sustainable resources. While having a large fiscal deficit it is not possible for the ASEAN countries to be able to fund the projects for environmental sustainability (Budina & Tuladhar, 2010; Plummer, 2002).

Hypothesis one (**H1**) is that the fiscal deficit has an impact on the environmental sustainability in the ASEAN countries.

2.2. The Relation between Interest Rate and Environmental Sustainability in ASEAN countries

The interest rates can be defined as the additional amount charged by the lender for the use of his assets. This amount is charged as a percentage of the principal amount in most cases. It can be collected on any interval of time according to the pre-decided agreement. The asset borrowed can be in any form including vehicles, buildings, consumer goods and cash (Abdullah, Ali, & Matahir, 2010; Tan & Tang, 2016). The amount of the borrowed assets is decided along with the interest rate and time period in a pre-discussed agreement. There are a few types of interest rates including simple interest rate and compound interest rate. According to the environmental experts the increase in the interest rate is directly linked with the increase in the exploitation of the environmental resources (Ismail, Ramirez-Iniguez, Asif, Munir, & Muhammad-Sukki, 2015; Lee, 2005). In order to ensure the environmental sustainability, the interest rate should be decreased. Many references of such situations are found in the economic history of the ASEAN countries. The high interest rates put an increased amount of pressure on the producers and industries due to which they tend to over utilize the resources that they have (Elliott, 2003; Rammal & Zurbrugg, 2006). They start increased utilization of non-renewable environmental resources. The increased pressure of production and revenue causes the furniture industry to cut down more forests. This rapid deforestation can be linked with many environmental issues. Similarly, the increased financial pressure on the other industries forces them to utilize more nonrenewable energy sources like gas, coal and oil. The waste is left untreated due to the

shortage of finances. Treatment of the waste is done in order to protect the environment (Hoang & Bui, 2015; Rüländ, 2000). The untreated liquid waste goes into the lakes, ponds and rivers. This is very harmful for the marine life and the soil near the water reserves. The chemicals and pollutants destroy the marine life and the water no longer remains drinkable. Similarly, the gases exhausted from the industries cause air pollution. Their treatment is skipped out when the industries are under financial pressure. Thus the air quality decreases over the years (Bayoumi, Eichengreen, & Mauro, 2000). There are many more examples recorded in the ASEAN countries. This way the increased interest rates result in increased exploitation of the environmental resources.

Hypothesis two (**H2**) is that the interest rate has an impact on the environmental sustainability in the ASEAN countries.

2.3. The Relation between Stock Exchange Index and Environmental Sustainability in ASEAN countries

The stock exchange index is the measurement of various sections in the market. The prices of a selected number of shares are used for the calculation of the stock market index. It helps the various investors to compare the rates and prices of the stocks in order to calculate the performance of the market. There are some defined criteria for the stock exchange indexes. They have to be transparent and investable. The investors are able to invest in any particular stock by the buying the index fund. The tracking error occurs when the index funds performance doesn't match with the index (Budina & Tuladhar, 2010; Plummer, 2002). Many experts and researchers have been arguing about the impact of stock market indexes on the environmental sustainability. It has been observed that the pollution control activities in various industries and businesses drive the prices of the stocks of the company. Such enterprises have lower risk stocks. The enterprises that have poor pollution control have an increased number of negative returns. The high-ranking companies have fewer negative returns than them and have more control over their pollution control. The companies require extra funds for the treatment of waste material and the use of sustainable energy sources (Elliott, 2003; Rammal & Zurbruegg, 2006). The asset size of such enterprises is different and so is the profitability. The ratio of the earnings and profit are better. They have higher earnings and lower risk. Investors tend to choose stocks for investing. The enterprises with more high-ranking stocks have more processes for preventing the environmental damaging and promoting environmental sustainability. The large size, lower systematic risk and the profitability have a major role in driving the price and performance of the stocks of an organization. This trend has been highlighted in the ASEAN countries. The increase in number of investors investing in the high-ranking companies result in a sustainable environment. The enterprises having poor pollution controls have lower stock market indexes. They have higher risks and the lower profitability. The investment in such corporations have proven to have a major negative impact on the environment.

Hypothesis three (**H3**) is that the stock market index has an impact on the environmental sustainability in the ASEAN countries.

3 Methodology

3.1. Data

In this study the researcher has used three independent variables, fiscal deficit, interest rate and stock exchange index and two control variables inflation and gross domestic product to evaluate their cumulative effect on the dependent variable environmental sustainability. The data for the period 1995-2018 has been collected from six ASEAN countries; Thailand, Cambodia, Indonesia, Laos, Brunei and the Philippines. The variables are defined as follows; the difference between the spending and consumption patterns of a country, the total dollars or amount excess of income is the fiscal deficit, calculated in terms of constant US dollars. The interest rate is defined in terms of the expense on investment, it is paid or charged in dollar amounts as a percentage of some value. The stock exchange index is defined in terms of yearly rate values of the listed organizations. Inflation is measured in terms of the CPI, which is the measurement of the value of goods and services by households. GDP, gross domestic product is measured in terms of constant US dollars. The dependent variable environmental sustainability is defined in terms of Co2 emissions and is measured in kilotons or kt. The data has been collected from the World bank from its database of World Development Indicators and the country government websites (Hussain et al., 2019).

The study uses the neoclassical production function for analyzing the relationship between the environmental sustainability, fiscal deficit, interest rate, stock exchange index, inflation and gross domestic product. The independent and control variables INR, SEI, FID, INF and GDP serve as individual inputs and ENS is the output. The production function is defined as follows.

$$ENS_{it} = f(INR_{it}, SEI_{it}, FID_{it}, INF_{it}, GDP_{it}) \quad (1)$$

The above functional relationship is converted into a linear model as follows.

$$ENS_{it} = \alpha_{it} + \beta_{1i}INR_{it} + \beta_{2i}SEI_{it} + \beta_{3i}FID_{it} + \beta_{4i}INF_{it} + \beta_{5i}GDP_{it} + \varepsilon_{it} \quad (2)$$

where α is the intercept and β is used to represent the intercept or the coefficient of each explanatory or control variables and ε_{it} is used to represent the error term.

3.2. Cross-sectional dependence test

In result of the increasing globalization, the countries across the world are homogenizing and the economic systems are becoming more susceptible and vulnerable to change. The increasing integration of economic systems has produced the issue of cross-sectional dependence, prevalent mainly in time series data. If the associations among the cross-sectional data isn't considered, then misleading results are produced which eradicate the authenticity and credibility of the study. The study followed the method used by Breusch and Pagan (1980) for testing the cross-sectional dependence

$$CD_{BP} = \sum_{i=0}^{n-1} \sum_{j=i+1}^n \rho^2_{i,j} \quad (3)$$

Conversely this test statistic exhibits a disadvantage in cases where N i.e. the number of cross-sections is large and therefore it cannot be applied in such scenarios (N is large and N leads towards ∞). In order to overcome this issue Pesaran (2004) introduced the LM statistic

$$CD_{LM} = \sqrt{1/N(N-1)} \sum_{i=0}^{n-1} \sum_{j=i+1}^n (T \rho^2_{i,j-1}) \quad (4)$$

According to Pesaran the above-mentioned statistic is to be used when the cross-sectional size is greater than the time dimension T

$$CD = \sqrt{2T/N(N-1)} [\sum_{i=0}^{n-1} \sum_{j=i+1}^n T \rho_{i,j}] \quad (4)$$

Where the term $\rho_{i,j}$ is used to indicate the correlation among the errors.

The study also analyzes the slope homogeneity by using the test developed by Pesaran and Yamagata (2008).

$$\Delta = \sqrt{N} \left[\frac{N^{-1}S-k}{\sqrt{2k}} \right] \quad (5)$$

3.3. Panel Unit root test

The panel unit root test is applied to the study variables in order to assess and evaluate the stationarity issues and properties of the variables. For this purpose, the CIPS unit root has been used in the study, this test accounts for the cross-sectional dependence among variables. The following regression was used for the cross-sectional augmented DF,

$$\Delta Y_{i,t} = a_i + b_i Y_{i,t-1} + c_i \overline{Y_{t-1}} + d_i \overline{Y_t} + \varepsilon_{i,t} \quad (6)$$

1 Pesaran proposed a cross-sectionally augmented version of the test

$$CIPS = \frac{1}{N} \sum_{i=1}^N CADF_i \tag{7}$$

Where the $CADF_i$ is the cross-sectionally augmented DF statistic. If the test statistic is greater than the critical values, then the null hypothesis will be rejected.

3.4. Panel Co-integration Test

The cointegration test is performed in order to account for the correlations existing between the time series data. The cointegration is analyzed on the basis of the Westerlund and Edgerton (2007) bootstrap LM panel cointegration test, which also examines the effect of cross-sectional dependence. The following test statistics have been used.

$$LM_N = \frac{1}{NT^2} \sum_{i=1}^N \sum_{t=1}^T \hat{w}_i^{-2} S_{it}^2 \tag{8}$$

In the above expression the term S_{it}^2 is used to express the partial sum of the error terms, \hat{w}_i^{-2} is used to show the long-run variance of the error terms. The present study uses the AMG estimators for analyzing the long run relationships among variables. These estimators have been used in the study because they account for the dependence and heterogeneity issues presented by panel data (Eberhardt & Bond, 2009).

3.5. Panel Causality Test

The causality analysis was also performed for studying the causal associations between the fiscal deficit, interest rate, stock exchange index and environmental sustainability. The test developed by Kónya (2006) has been used.

4 Empirical results

5 The first test performed on the data is for analyzing the cross-sectional dependence and slope heterogeneity among the study variables. The null hypothesis of the cross-sectional dependence test is that if the probability values are smaller than the significant statistics then the null hypothesis is rejected. The null hypothesis contends for no cross-sectional dependence, whereas the alternate hypothesis states a presence of cross-sectional dependence among the study variables. The results of the test are depicted in table. It can be seen that CD_{BP} , CD_{LM} and CD are significant thus, the null hypothesis of the cross-sectional dependence test is rejected. The analysis shows the results with different levels of significance as well. It can be seen that there is a presence of cross-sectional dependence among the variables included in the study. The slope homogeneity test is performed in order to evaluate the heterogeneous properties of the data. The null hypothesis for this test states the presence of homogeneity whereas the alternate hypothesis states the presence of heterogeneity. According to the results of the delta tests, the assumption of homogeneity has been rejected and the coefficients are found to be heterogeneous.

Table 2: Cross-Section Dependence and Slope Homogeneity Tests Results

Variable	CD_{BP}	CD_{LM}	CD
ENS	183.203*	59.255*	34.898*
FID	199.400*	50.256*	32.294**
INR	182.309**	63.424**	26.844*
SEI	193.293*	60.323*	43.677*
INF	187.293*	67.422*	29.329**
1 DP	133.399**	79.399*	33.163**
Slope Homogeneity Tests Results			
Tests	LM Statistics	t-value	P-Value
Delta	54.78	4.897	.000
Adj Delta	44.30	3.868	.000

The next test applied on the data is the panel unit root test. Table 2 presents the results from the analysis. The null hypothesis for the test is that there is presence of unit root and the alternate hypothesis contends for the non-presence of unit roots. The presence of unit roots in the data are reasons for spurious regressions and faulty regressor estimates. The panel unit root test is performed in order to evaluate the stationary properties of the variables and also to find its order of integration. The results intimate that GDP, FID, SEI and INF are significant at level whereas all the variables are significant at the first difference. All variables at the first difference demonstrate stationary properties, the series is integrated at the first order I (1).

Table 3: CIPS Panel Unit Root Test Results

Variable	At Level	First Difference
ENS	-0.1208	-4.2004**
FID	-2.3092*	-7.3499**
INR	-0.9768	-6.2994***
SEI	-1.2993*	-7.288**
INF	-3.8299*	-9.2844***
GDP	-3.2321**	-8.8484**

The LM bootstrap test has been performed on the data in order to check for the presence of cointegration among the study variables. Table 3 presents the results of this analysis. The decision criterion for this test is that if the Bootstrap p -value is less than the LM statistic value, then the null hypothesis i.e. absence of cointegration is rejected. The table demonstrates the results of the test, it can be seen that the p-values are less than the LM statistic therefore the null hypothesis is rejected, and the alternate hypothesis is accepted. The table values show that ENS, FID, INR, SEI, INF and GDPO are associated with each other in the end.

Table 4: LM Bootstrap Panel Cointegration Test Results

Conditions	LM statistics	Bootstrap p-value
Constant	-5.309	0.788
Constant + Trend	3.888	0.209

The AMG estimators have been used for evaluating the long run associations among the study variables. The results of the estimation are presented in table 4. The results of the fiscal deficit show that there is presence of a negative relationship with environmental sustainability. The results for consumption show that it has a significant effect on the environmental sustainability for three ASAEN countries; the results are not significant for Cambodia, Laos, and Thailand. The results depict that an increase in the fiscal deficit will initiate a decreasing effect in the environmental sustainability. Interest rate also has a negative relationship with environmental sustainability, where the results for all six countries are significant. The effect of stock exchange index is positive and significant for the sample countries. The effects of the control variables are also significant and produce a positive effect on the environmental sustainability of the sample countries.

Table 5: AMG Estimation Results

Countries	FID	INR	SEI	INF	GDP
Brunei	-0.121**	-0.231**	0.212**	0.002	0.223**
Cambodia	-0.023	-0.222*	0.293**	0.022	0.331*
Indonesia	-0.112*	-0.199**	0.132*	0.211*	0.233**
Laos	-0.088	-0.283**	0.123*	0.112*	0.244**
Thailand	-0.034	-0.212**	0.288**	0.143*	0.235**
Philippines	-0.112*	-0.133**	0.077	0.122*	0.233**
Penal	-0.271**	-0.384**	0.232***	0.284**	0.393**

Table 5 presents the results of the causality analysis. The decision rule is simple, the relationships with probability values less than 0.05 show causality. The table values are used to determine the unidirectional and bidirectional associations. FID and ENS have a bidirectional association i.e. fiscal deficit cause environmental sustainability and vice versa. There is presence of bidirectional associations between INR and ENS and SEI and ENS as well. The

causal associations among the independent variables are also analyzed. FID and INR have a bidirectional relationship whereas FID and SEI and INR and SEI have a unidirectional association.

Table 5: Kónya Panel Causality Test Results

Null Hypothesis:	F-Statistic	Prob.
FID does not Granger Cause ENS	5.3103	0.0003
ENS does not Granger Cause FID	6.3993	0.0001
ENS does not Granger Cause INR	5.2001	0.0000
INR does not Granger Cause ENS	6.2003	0.0000
ENS does not Granger Cause SEI	8.0294	0.0000
SEI does not Granger Cause ENS	9.2034	0.0000
FID does not Granger Cause INR	4.3299	0.0055
INR does not Granger Cause FID	3.7649	0.0644
FID does not Granger Cause SEI	3.6499	0.3455
SEI does not Granger Cause FID	6.7492	0.0566
INR does not Granger Cause SEI	0.2984	0.5568
SEI does not Granger Cause INR	6.8133	0.0770

5 Discussion

This study used the AMG estimation and the causality analysis to study the relationship between environmental sustainability and different fiscal matters relevant to the macroeconomic policies of the ASEAN countries under consideration. The study by Thuy (2018) uses data from ASEAN countries to study the relations between the fiscal policies and the economic and environmental sustainability. A long run relation between the indicators of the study was established and associations between government spending, revenue and growth characteristics were found as well. The results of this study correlate with the findings of our study as there is presence of long run relationship among the interest rate, fiscal deficit, stock exchange index and environmental sustainability. These variables correlate with economic growth and are associated with the environmental sustainability, the associations are also proven by the causality analysis. Another study by Fakher (2016) investigated the effects of the budget deficit, money supply, real GDP, price index of imports, interest rate, inflation on the environmental and economic performance of Asian countries, for the period of 1993-2013. The study used the pooled mean group estimation-based error correction model and the GMM. The results indicate presence of statistically significant relationships among the variables. The results of our study also indicate that significant, inverse relationships are prevalent between fiscal deficit and environmental sustainability and interest rate and fiscal deficit as well. The negative associations show that on increase of interest rate the sustainability will decrease, decreasing investment rate is associated with increasing economic activity which leads towards greater sustainability (Alola, Bekun, & Sarkodie, 2019; Arbolino, Carlucci, De Simone, Ioppolo, & Yigitcanlar, 2018).

5.1. Conclusion

The primary aim of this study was to evaluate the associations among the economic sustainability, fiscal deficit, interest rate and stock exchange index on the ASEAN countries for the period 1995-2018. The relationships among the outcome and explanatory variables was analyzed as these variables relate to economic and environmental sustainability. Different econometric tools were used to analyze different properties of the data, the tests regarding cross sectional dependence, panel unit root test, homogeneity test, cointegration analysis, AMG estimation and causality tests are employed on the data. The results of the analysis show that there is a negative relationship between interest rate and environmental sustainability, which indicate that increase in the interest rate will influence decreased environmental sustainability. Inverse associations between economic sustainability and fiscal deficit were also found. The causality analysis shows majority of associations to be bidirectional i.e. FID & ENS, ENS & INR, ENS & SEI. Whereas unidirectional associations among FID & INR and SEI & INR are present.

5.2. Limitations

The study presents some limitations. The present study uses a small sample size i.e. 1995-2018, future researchers are recommended to follow a larger dataset in future studies so that the historical and future relations can be analyzed. The panel data has been used in this study which is susceptible to cross-sectional dependence and heterogeneity problems thus it is advised that the future researchers focus on using the cross-sectional data. The fiscal effects have been studied from only three dimensions, it is recommended that other variables that focus on fiscal and macroeconomic policies are also included in future studies. Future studies should also focus on diversifying the unit of analysis and integrate other countries as well so that the cross-sectional dependence issues can be overcome.

5.2. Implications

The present study focuses on the fiscal determinants and indicators related to microeconomic policy and their relevance to the environmental sustainability has also been analyzed. The area has been generating researcher interest in the last few years thus the study has important academic and theoretical implications. The policy makers of the relevant countries will be able to use the results of this study in the development of appropriate fiscal policies with a focus on the environmental sustainability.

References

- Abdullah, H., Ali, J., & Matahir, H. (2010). Re-examining the demand for money in Asean-5 countries. *Asian Social Science*, 6(7), 146.
- Alola, A. A., Bekun, F. V., & Sarkodie, S. A. (2019). Dynamic impact of trade policy, economic growth, fertility rate, renewable and non-renewable energy consumption on ecological footprint in Europe. *Science of the Total Environment*, 685, 702-709.
<https://www.sciencedirect.com/science/article/pii/S0048969719321643>
- Anbumozhi, V., & Phoumin, H. (2015). *Tracking Clean Energy Progress in ASEAN Member States and Analysis of Implementation Deficits*. Retrieved from
- Arbolino, R., Carlucci, F., De Simone, L., Ioppolo, G., & Yigitcanlar, T. (2018). The policy diffusion of environmental performance in the European countries. *Ecological Indicators*, 89, 130-138.
<https://www.sciencedirect.com/science/article/abs/pii/S1470160X18300694>
- Bayoumi, T., Eichengreen, B., & Mauro, P. (2000). On regional monetary arrangements for ASEAN. *Journal of the Japanese and International Economies*, 14(2), 121-148.
<https://www.sciencedirect.com/science/article/pii/S0889158300904465>
- Bayoumi, T., & Mauro, P. (2001). The suitability of ASEAN for a regional currency arrangement. *World Economy*, 24(7), 933-954.
<https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-9701.00390>
- Bende, A., & Slater, N. J. (2003). Private capital formation: Short- and long-run crowding-in (out) effects in ASEAN, 1971-99.
- Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The review of economic studies*, 47(1), 239-253.
<https://www.jstor.org/stable/2297111?seq=1>
- Budina, N., & Tuladhar, A. (2010). Post-crisis fiscal policy priorities for the ASEAN-5. *IMF Working Papers*, 1-27.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1750741
- Buracom, P. (2014). ASEAN Economic Performance, Institutional Effectiveness, and Foreign Direct Investment. *Asian Affairs: An American Review*, 41(3), 108-126.
- Chuanrommanee, W., & Swierczek, F. W. (2007). Corporate governance in ASEAN financial corporations: reality or illusion? *Corporate Governance: An International Review*, 15(2), 272-283.
<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8683.2007.00559.x>
- Eberhardt, M., & Bond, S. (2009). Cross-section dependence in nonstationary panel models: a novel estimator.
- Elliott, L. (2003). ASEAN and environmental cooperation: norms, interests and identity. *The Pacific Review*, 16(1), 29-52.
<https://www.tandfonline.com/doi/abs/10.1080/0951274032000043235>
- Fakher, H.-A. (2016). The empirical relationship between fiscal deficits and inflation (Case study: Selected Asian economies). *Iranian Economic Review*, 20(4), 551-579.

https://ier.ut.ac.ir/article_59605.html

Ferguson, R. J. (2004). ASEAN Concord II: policy prospects for participant regional" development". *Contemporary Southeast Asia*, 393-415.

Gochoco-Bautista, M. S., & Remolona, E. M. (2012). Going regional: how to deepen ASEAN's financial markets. *Asian Development Bank Economics Working Paper Series*(300).

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2032824

Hoang, H., & Bui, D. (2015). Determinants of foreign direct investment in ASEAN: A panel approach. *Management Science Letters*, 5(2), 213-222.

<http://growingscience.com/beta/msl/1843-determinants-of-foreign-direct-investment-in-asean-a-panel-approach.html>

Hussain, H.I., Kamarudin, F., Thaker, H.M.T. & Salem, M.A. (2019) Artificial Neural Network to Model Managerial Timing Decision: Non-Linear Evidence of Deviation from Target Leverage, *International Journal of Computational Intelligence Systems*, 12 (2), 1282-1294. <https://doi.org/10.2991/ijcis.d.191101.002>

Hussain, H.I., Shamsudin, M.F., Anwar, N.A.M., Salem, M.A. & Jabarullah, N.H. (2018). The Impact of Shari'ah Compliance on the Adjustment to Target Debt Maturity of Malaysian Firms, *European Research Studies Journal*, 21 (2), 48 – 61.

https://www.ersj.eu/dmdocuments/04.HUSSAINETALL_XXI_2_18.pdf

Ismail, A. M., Ramirez-Iniguez, R., Asif, M., Munir, A. B., & Muhammad-Sukki, F. (2015). Progress of solar photovoltaic in ASEAN countries: A review. *Renewable and Sustainable Energy Reviews*, 48, 399-412.

<https://www.sciencedirect.com/science/article/abs/pii/S1364032115002804>

Kónya, L. (2006). Exports and growth: Granger causality analysis on OECD countries with a panel data approach. *Economic Modelling*, 23(6), 978-992.

Kim, A., Zvezdin, A., Rogaleva, L., Fitina, L., & Bannikov, S. (2020). Research of personality preparedness for sports performance in young footballers. *Revista de Psicología del Deporte*, 29(2), 185-192

Lee, C. (2005). Exchange rate misalignments in ASEAN-5 countries.

Letchumanan, R. (2010). Is there an ASEAN policy on climate change. *Climate Change: Is Southeast Asia Up to the Challenge*, 50-62. <http://eprints.lse.ac.uk/43572/>

López, F. S. (2020). Ingreso disponible y emisión de flujos turísticos internacionales de México. *Cuadernos de Economía*, 43(121). <https://doi.org/10.32826/cude.v43i121.77>

Manzano, G. (2001). Is there any Value-added in the ASEAN Surveillance Process? *ASEAN Economic Bulletin*, 94-102.

Monni, S., Iorio, M., Realini, A. (2018). Water as freedom in the Brazilian Amazon, *Entrepreneurship and Sustainability Issues* 5(4): 812-826 [http://doi.org/10.9770/jesi.2018.5.4\(8\)](http://doi.org/10.9770/jesi.2018.5.4(8))

Moumen, Z., El Idrissi, N.E.A., Tvaronavičienė, M., Lahrach, A. (2019). Water security and sustainable development. *Insights into Regional Development*, 1(4), 301-317. [https://doi.org/10.9770/ird.2019.1.4\(2\)](https://doi.org/10.9770/ird.2019.1.4(2))

Nguitraoool, P. (2010). *Environmental Cooperation in Southeast Asia: ASEAN's Regime for Trans-boundary Haze Pollution*: Routledge.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels.

Panjaitan, T. W. S., Dargusch, P., Wadley, D., Ammar, A. A. (2020). Toward the best practice emissions reduction in an emerging economy: An analysis of cement manufacturing in Indonesia. *Entrepreneurship and Sustainability Issues*, 8(1), 103-122. [http://doi.org/10.9770/jesi.2020.8.1\(7\)](http://doi.org/10.9770/jesi.2020.8.1(7))

Pesaran, M. H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of econometrics*, 142(1), 50-93.

<https://www.sciencedirect.com/science/article/abs/pii/S0304407607001224>

Plummer, M. G. (2002). The EU and ASEAN: Real integration and lessons in financial cooperation. *World Economy*, 25(10), 1469-1500.

Rajan, R. S. (2005). Financial Integration in ASEAN and Beyond: Implications for Regional Monetary Integration. *Roadmap to an ASEAN Economic Community*, 246.

Rammal, H. G., & Zurbrugg, R. (2006). The impact of regulatory quality on intra-foreign direct investment flows in the ASEAN markets. *International Business Review*, 15(4), 401-414.

<https://www.sciencedirect.com/science/article/abs/pii/S0969593106000552>

Rüland, J. (2000). ASEAN and the Asian crisis: theoretical implications and practical consequences for Southeast Asian regionalism. *The Pacific Review*, 13(3), 421-451.

Sen, R., Asher, M. G., & Rajan, R. S. (2004). ASEAN-India economic relations: current status and future prospects. *Economic and Political Weekly*, 3297-3308. <https://www.jstor.org/stable/4415291?seq=1>

Severino, R. (2005). *Framing the ASEAN charter: An ISEAS perspective*: Institute of Southeast Asian Studies.

Sharma, S. V. (2014). Energy Trade Practices in India: Review of Tariff and Non-Tariff Barriers in Relation to ASEAN. *ERIA Research Project Report FY2013, Jakarta: ERIA*, 27-62.

Simatupang, B. (2002). Association of the South-East Asian Nations'(ASEAN) and Free Trade Area (AFTA). *Regionalization and Globalization in the Modern World Economy: Perspectives on the Third World and Transitional Economies*, 307.

Sugiharti, L., Purwono, R., Esquivias, M.A. (2020). Analysis of determinants of Indonesian agricultural exports. *Entrepreneurship and Sustainability Issues*, 7(4), 2676-2695. [http://doi.org/10.9770/jesi.2020.7.4\(8\)](http://doi.org/10.9770/jesi.2020.7.4(8))

- Tan, B. W., & Tang, C. F. (2016). Examining the causal linkages among domestic investment, FDI, trade, interest rate and economic growth in ASEAN-5 countries. *International Journal of Economics and Financial Issues*, 6(1), 214-220.
- Tay, S. S., Estanislao, J. P., & Soesastro, H. (2001). *Reinventing Asean* (Vol. 228): Institute of Southeast Asian Studies.
- Thuy, N. T. (2018). Fiscal Sustainability in Some ASEAN Countries: Evidence from a Panel Data Analysis. <http://m.growingscience.com/beta/msl/2890-microfinance-institutes-non-financial-services-and-women-empowerment-the-role-of-vulnerability.html>
- Yeganeh Kia, H. (2020). A typology of sources, manifestations, and implications of environmental degradation. *Management of Environmental Quality: An International Journal*, 31(3), 765-783. <https://www.emerald.com/insight/content/doi/10.1108/MEQ-02-2019-0036/full/html>
- Vithayasrichareon, P., MacGill, I. F., & Nakawiro, T. (2012). Assessing the sustainability challenges for electricity industries in ASEAN newly industrialising countries. *Renewable and Sustainable Energy Reviews*, 16(4), 2217-2233.
- Westerlund, J., & Edgerton, D. L. (2007). A panel bootstrap cointegration test. *Economics letters*, 97(3), 185-190. <https://www.sciencedirect.com/science/article/abs/pii/S0165176507000900>

Marlina WIDIYANTI

Faculty of Economics, University Sriwijaya, Indonesia
<https://orcid.org/0000-0003-0431-814x>

Isfenti SADALIA

Faculty of Economics and Business, Universitas Sumatera Utara, Medan, Indonesia.
<https://orcid.org/0000-0002-4674-1221>

Andhyka Tyaz NUGRAHA

Faculty of Economics and Business, Universitas Sumatera Utara, Medan, Indonesia.
<https://orcid.org/0000-0002-4674-1221>

Register for an ORCID ID:

<https://orcid.org/register>

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>



Integrating fiscal matters with environmental sustainability in ASEAN countries role of fiscal deficit interest rate and stock exchange index

ORIGINALITY REPORT

8%

SIMILARITY INDEX

5%

INTERNET SOURCES

5%

PUBLICATIONS

4%

STUDENT PAPERS

PRIMARY SOURCES

- 1** Mucahit Aydin. "The effect of biomass energy consumption on economic growth in BRICS countries: A country-specific panel data analysis", *Renewable Energy*, 2019
Publication **3%**
- 2** Submitted to Suan Sunandha Rajabhat University
Student Paper **3%**
- 3** www.lka.lt
Internet Source **1%**
- 4** Submitted to University of Greenwich
Student Paper **1%**
- 5** www.tandfonline.com
Internet Source **1%**

Exclude bibliography On