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# The impacts of economic freedom on the environment: The case of carbon dioxide emissions in seven ASEAN countries

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**Abstract.** Global warming has been acknowledged as one of the main environmental issues, and economic freedom as one of the institutional factors is believed to be the key to protecting the environment. This study evaluates the proposition that countries with higher economic freedom will have a better environment than countries with a dictatorship government. This study uses panel data regression data from 2011 to 2017 and consists of seven ASEAN Countries. This study constructs an econometrics model with three main variables, i.e., economic freedom, Information, and Communication Technology (ICT), and real gross domestic products (GRDP) that have an impact on carbon dioxide (CO<sub>2</sub>) emissions. The main results show that (1) higher economic freedom leads to low CO<sub>2</sub> emissions. (2) better Information and Communication Technology reduces the level of CO<sub>2</sub> emissions. And (3) Positive economic growth influence a higher level of CO<sub>2</sub> emissions. The policy implication implies that the governments in seven ASEAN countries should support more economic freedom to support a better environment, use efficient ITC that leads to the protection of the environment. Apply the environmental statistics into the calculation of GRDP to improve countries' capacities to manage their economies and natural resources.

## 1. Introduction

*Homo sapiens*, or humans, have been blamed for the low quality of the environment. Environmental problems occur when there are irresponsible *homo economicus* actions that exploit the natural resources endlessly. Still, the economics principles mainly suggest that environmental issues are only "a market failure" [1]. The awareness of the significant impacts of property rights and economic institutions to reduce environmental issues was firstly discussed a long time ago [2], but the roles of government in markets toward the environment are still often ignored. The previous studies on the effects of economic variables on the quality of the environment have risen over the past few years, but a key issue nowadays is whether more governmental power into the economy improves or hurts the environment [1].

The Southeast Asian region is full of natural resources. However, the misuse of natural resources has reverted to humans in the negative effect of environmental destruction. Unquestionably, the impacts of air pollution on human health are extremely severe. There were about 450,000 people who died in Southeast Asia during 2018 in correlation with air pollution [3], and a study shows that from 35 Southeast Asia's cities, the unhealthy air pollution levels found in 22% of the cities and moderately unhealthy levels in most of the cities in Southeast Asia [4]. It occurs because Southeast Asia nations are reliant on fossil fuel, where its demand has increased more than 80% since 2000, and use of the fossil fuel correlates to a 75% rise in carbon dioxide (CO<sub>2</sub>) emissions [3].



Under the dangers of high-speed accumulation of CO<sub>2</sub> emissions in the region, Southeast Asia countries protect the environment. The Association of Southeast Asian Nations (ASEAN) members have updated policy frameworks to protect the environment in recent years. For example, in 2007, ASEAN leaders agreed to adopt the Cebu Declaration on energy security. The Cebu Declaration mainly encourages nations to focus more on energy usage effectiveness, using new renewable energy and using technologies that decrease CO<sub>2</sub> levels linked with burning coal [5]. The adaptation of new regulations relating to the protection of the environment shows ASEAN leaders' full support for the use of renewable energy. In general, it seems that the demand for fossil energy will continue or even increase without renewable energy support from the governments [6].

The governments' support for the preservation of the environment raises an issue of whether. There is a connection between the economic freedom of a nation with a better quality of the environment. If the environmental problem is a market failure, will the environment improve when the central government influences the country's economy? [1]. At this point, bigger freedom may be the prominent reason for market failure, which leads to the decrease of environmental quality [6]. For example, pollution is a situation where the economic activities of individuals harm the rights of other individuals, so it justifies government intervention to control the economic activities [2]. However, on the other side, economic freedom causes efficiency and competitive markets, any economic activity such as liberalisation may have the advantage to use resources effectively [7]. Therefore, risen efficiency is correlated with a low level of CO<sub>2</sub> emissions. Since there are two opposite opinions about the role of economic freedom on the environment, a question is raised: in the case of ASEAN Countries, will stricter governmental controls over the economy be the best answer for the protection of the environment, or lesser governmental controls will be helpful to reduce the pressure on the environment?

Previous studies projected that higher economic freedom raises CO<sub>2</sub> emissions in both poor and rich countries (for example, [7] and [8]). A study in Pakistan finds that higher economic freedom boosts economic activities but, in the end, it increases emissions in the atmosphere [9]. On the other side, a rise in economic freedom improves the quality of the environment in Africa [10]. Economic freedom correlates with positive environmental outcomes [13]. Carlsson and Lundström [7] use specific economic freedom variables, i.e., *price stability and legal security*, find that these variables lower the level of CO<sub>2</sub> emissions in nations with a low industrial sector share of Gross Domestic Product (GDP), but an increasing effect in nations with a substantial industrial sector share of GDP. In addition, previous studies also find an unrelated relationship between economic freedom and environmental performance. Rapsikevicius et al [6] use trend analysis and indicate that there is no significant relationship between economic freedom and environmental quality. Similarly, Wood and Herzog [2] cannot find the connection between economic freedom and CO<sub>2</sub> emissions in their study.

Economic freedom is one of the important factors of economic wealth [2], it promotes economic development [6], and it also increases countries' competitiveness [11]. Economic freedom is when individuals can be involved in economic actions without government intervention as long as individual activities do not harm the rights of other individuals [2]. Economic freedom as an individual autonomy, in which he or she has the freedom of obtaining and using economic goods and resources [12].

Two different channels about the impact of economic freedom on the quality of the environment [13]. Firstly, in high economic freedom countries, open-minded people should be able to exploit the better capacities of the market in spreading and organising information concerning the limited of natural resources, and then try to reduce imperfect information problems related to the destruction of the environmental practice. Secondly, free countries are well known for their highly competitive behaviours, which will lead to the creation of better innovation tools or systems in the use of scarce resources.

In addition, Carlsson and Lundström [7] introduces three hypotheses regarding economic freedom variables' influences on CO<sub>2</sub> emissions. First, *The Efficiency Effect*. It is assumed that economic freedom improves efficiency and makes competitive markets. However, resource efficiency has not had a direct impact on the reductions of CO<sub>2</sub> emissions. Due to competition, firms must adapt to changes in the market environment to survive. Due to cost-minimising reasons, fewer resources would be utilised, and less waste would be produced at a given production level. At this point, a lower production level is

associated with low use of energy. Energy use has direct impacts on CO<sub>2</sub> emissions, and cost minimisation may lead to a reduction in gas emissions. Second, *The Trade Regulation Effect*. Government controls on trade, in terms of trade liberalisation, are believed to affect economic freedom. Trade liberalisation has two different effects, i.e., the efficiency and the “pollution haven” effects. Trade liberalisation makes effective resource allocation due to the high market competition in international markets. On the other side, trade liberalisation increases specialisation, and nations with lax environmental laws and a larger share of capital-intensive production will be likely to be especially engaged in non-environmentally friendly industries, so-called “pollution haven” effect. Hence, the final expected effect of economic freedom on gas emissions is unclear. The impact of improved efficiency is likely to decrease CO<sub>2</sub> emissions, while the impact of pollution haven can be both positive and negative on emissions subject to the economy's structure. Third, *The Stability Effect*. Stable prices and more protection property rights are believed to lead to more efficient investment and consumption choices. A stable macroeconomic situation also promotes better investment planning in future. A stable macroeconomic condition will lead to lower emissions when there is a belief that the economy will be in a conducive situation in the future.

A research option for answering this question is to investigate the influence of economic freedom (it is, the extent of government control in the economy) on the quality of the environment. The empirical results on the effect of economic freedom on the decline of environmental quality are not certain and mixed. The connection between economic freedom and environmental quality is gradually clearer, but the evidence is inadequate in quantity and area coverage.

There is no consensus about the impacts of economic freedom on the quality of the environment. So, it is important to examine empirically how higher freedom affects CO<sub>2</sub> emissions in the case of ASEAN Countries. This paper makes an important contribution. It contributes to the existing literature by explaining the link between economic freedom and environmental performance in ASEAN. To the best of our knowledge, no literature discuss the connection in the case of ASEAN nations, so this study provides original empirical evidence to fill the gap in the literature.

This paper's structure is set as follows: Section 1 is an introduction and briefly looks at the conceptual relationship between economic freedom and environmental outcomes. Section 2 discusses the research method, and a discussion of the results is presented in Section 3, and Section 6 is the conclusion.

## 2. Methodology

The main hypothesis for this study is that economic freedom would lead to good qualities of environmental outcomes, i.e., lower levels of CO<sub>2</sub> emissions. This study applies Least Square Dummy Variables (LSDV) method from seven ASEAN nations. The data are from 2011 until 2017. We establish an econometrics model with three independent variables: economic freedom (EFREE), information and communication technology (ICT), and real gross domestic products (RGDP), that may have an impact on CO<sub>2</sub> emissions in seven ASEAN Nations. As we are testing the influence of economic freedom on CO<sub>2</sub> emissions, we adopt [13]'s model, and then we construct a model as follows:

$$\ln(\text{EMISSION})_{it} = \beta_0 + \beta_1 \ln(\text{EFREE})_{it} + \beta_2 \ln(\text{ICT})_{it} + \beta_3 \ln(\text{RGDP})_{it} + u_{it} \quad (2.1)$$

Where,  $\ln$  is a symbol of the natural logarithm,  $u$  indicates the disturbances that are presumed to be normally distributed,  $\beta_0$  is a constant,  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are the parameters of the model. The quality of the Environmental (EMISSION) is proxied by total CO<sub>2</sub> emissions (in a metric ton of CO<sub>2</sub>). Economic freedom (EFREE) is the Index of Economic Freedom data from the Heritage Foundation as the indication of the degree of economic freedom of a country, information and communication technology (ICT) uses ICT Development Index. ICT Development Index is a level of the development of a country's Information and Communication Technology. The ICT Development Index has a value between 0 to 10, where the value of ten signals that the country's ICT development is the best, and if the value of zero indicates the country's ICT development is the worst. A country's gross domestic products measure real



gross domestic products (RGDP) in real terms. Data are collected from the Heritage Foundation, World Economic Forum, World Bank and International Energy Agency.

### 3. Results and discussion

This study uses panel data and runs with Least Square Dummy Variables (LSDV) technique. The result of the LSDV is presented in table 1. The output indicates that the parameter related to the economic freedom (EFEE) variable is negative and statistically significant at the 99% confidence level, which means that a 1% increase in the index of economic freedom is significantly reducing the level of CO<sub>2</sub> emissions by about 1.622%, which implies that higher economic freedom in seven ASEAN Countries improves the countries' environmental quality. Therefore, this study confirms previous studies by Adesina and Mwamba [10] and Hartwell and Coursey [13]. In contrast, this study does not support a previous study by Majeed et al [9] that shows higher economic freedom increases emissions. This study is also not in line with Wood and Herzog [2] and Rapsikevicius [6] that find no link between economic freedom and emissions.

**Table 1.** Result of the least square dummy variables.

<b>Dependent Variables</b>	<b>Coefficients</b>	<b>t-statistics</b>	<b>p-values</b>
<i>Ln</i> (EFREE)	-1.622	-2.365	0.000
<i>Ln</i> (ICT)	-0.382	-2.818	0.008
<i>Ln</i> (RGDP)	1.810	8.928	0.000
Constant	-10.280	-13.781	0.000
Adjusted R <sup>2</sup>	0.995		

Note: **Independent Variable: *Ln* (EMISSION)**

As this study finds a negative relationship between economic freedom and CO<sub>2</sub> emissions, the reason is straightforward. To attract investments to ASEAN Countries, ASEAN has ASEAN Comprehensive Investment Agreement (ACIA) that aims to promote a good investment climate in ASEAN. ACIA promotes free, open, and competitive investment with four investment pillars, i.e. (1) liberalisation; (2) facilitation; (3) promotion; and (4) protection of investments made by investors. The four investment pillars of ACIA indicate that ASEAN supports higher economic freedom to attract investment (ASEAN Secretariat, 2017). ACIA has successfully increased foreign direct investment (FDI) inflows in ASEAN. The ACIA confirms the three hypotheses suggested by Carlsson and Lundström [7]. ASEAN believes that economic freedom will lead to efficiency and competitive markets (*the Efficiency Effect*). ASEAN also believes that trade liberalisation is important and affect higher economic freedom (*the Trade Regulation Effect*). ASEAN also promises the protection of property rights (*the Stability Effect*). The main key of the negative relationship between economic freedom and CO<sub>2</sub> emissions in ASEAN is efficiency, competitive markets, trade liberalisation and protection of property rights. In the end, economic freedom in terms of better efficiency, highly competitive markets, highly trade liberalisation, and protection of property rights in ASEAN reduces CO<sub>2</sub> emissions level.

The parameter related to the country's information and communication technology (ICT) variable is negatively significant at the 99% confidence level. The negative coefficient on the country's ICT variable suggests that a 1% increase in the ICT Development index results in a 0.382% decrease in the level of CO<sub>2</sub> emissions. The ICT Development index evaluates the capacity of countries to provide the infrastructure of the ICT. Therefore, nations with a high level of ICT Development index show that the nations use efficient information and communication technology that lead to the protection of the environment. In addition, the coefficient related to the real gross domestic product (GRDP) is positive and significant against CO<sub>2</sub> emissions at the 99% confidence level. This result is rather unexpected, but it is explainable. The high real gross domestic product indicates that some portion of the population in a country upgrade themselves to middle-class and high-class incomes, which results in higher CO<sub>2</sub> emissions due to the high consumption of non-eco-friendly products, such as motorcycles and automobiles. The current levels of the real gross domestic product suggest that consumption behaviours

of the communities are still preferable to non-eco-friendly products and still have no awareness of the importance of using the green product to protect the environment.

#### 4. Conclusion

The understanding of the importance of protecting the environment has been the main target in pursuing people welfare. This study aims to investigate the probability of the influence of economic freedom on the destruction of the environment. The study's finding suggests the importance of higher economic freedom in ASEAN to guarantee that the region can enjoy economic activities without producing harmful CO<sub>2</sub> emissions. This study also shows that the country's information and communication technology and real gross domestic product impacts the CO<sub>2</sub> emissions in seven ASEAN countries.

Our study shows that the discussion on reducing environmental problems must also include the quality of economic freedom. In the end, we have strong evidence that economic freedom is undeniably vital for reducing CO<sub>2</sub> emissions problems in ASEAN. So, we strongly suggest the Governments in seven ASEAN countries put more effort into increasing economic freedom, limiting the countries' power on economic activities, rather than more control on it. All ASEAN members suggest that they amend the ASEAN Comprehensive Investment Agreement if necessary to further promote economic freedom by improving efficiency, more competitive markets, fair trade liberalisation, and property rights protection.

#### References

- [1] Stroup R L 2003 *Proc of the Conf Sponsored by the Federal Reserve Bank of Dallas* (Dallas: Federal Reserve Bank of Dallas) p 73 – 93
- [2] Wood J and Herzog I 2014 *Economic Freedom and Air Quality* (Vancouver, Canada: Fraser Institute)
- [3] International Energy Agency 2019 *Southeast Asia Energy Outlook 2019*
- [4] IRENA 2020 *Global Renewables Outlook: Energy Transformation Southeast Asia*
- [5] Han P, Kimura S and Malik C L 2021 *Energy Outlook and Energy Saving Potential in East Asia 2020*, ed Han, P and Kimura S (Jakarta: ERIA) p 1 – 32
- [6] Rapsikevicius J, Bruneckiene J, Lukauskas M and Mikalonis S 2021 *Sustblty* **13** 1 – 20
- [7] Carlsson F and Lundström S 2003 *The Effects of Economic and Political Freedom on CO<sub>2</sub> Emissions* (Working Papers in Economics no 29 Revised version February 2003)
- [8] Joshi P and Beck K 2018 *Energy Res Soc Sci* **39** 46 – 54
- [9] Majeed M T, Yu Z, Maqbool A, Genie M, Ullah S and Ahmad W 2021 *Envi Sci and Poll Re* **28** 41912–41921
- [10] Adesina K S and Mwamba J W M 2019 *the J Dev Area* **3** 155 - 167
- [11] De Grauwe P and Ji Y 2020 *Eur Econ Rev* **124** 1 – 29
- [12] The Heritage Foundation 2021 *Index of Economic Freedom*
- [13] Hartwell C A and Coursey D L 2015 *Eco Bus Letters* **1** 36 – 50