opción

Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía, Lingüística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

Año 36, 2020, Especial N° 26

Revista de Ciencias Humanas y Sociales
ISSN 1012-1587/ ISSNe: 2477-9385
Depósito Legal pp 198402ZU45

Universidad del Zulia
Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
Maracaibo - Venezuela

Opción, Año 36, Especial No.26 (2020): 1348-1361
ISSN 1012-1587/ISSNe: 2477-9385

Energy use, economic growth, energy subsidies, CO_2 emissions towards population growth

Al Yuda Suci Pratama[1]
[1]Faculty of Economics and Business,
Syiah Kuala Universitiy, Indonesia
alyudasucipratama@unsyiah.ac.id

Aliasuddin[2]
[2]Faculty of Economics and Business,
Syiah Kuala Universitiy, Indonesia
aliasuddin@unsyiah.ac.id

Taufiq C. Dawood[3]
[3]Faculty of Economics and Business,
Syiah Kuala Universitiy, Indonesia
taufiq.dawood@unsyiah.ac.id

Abstract

This study examines the influence of energy consumption, economic growth, energy subsidies, population growth on CO2 emissions by using methods Generalized Method of Moment (GMM). GMM testing found that oil prices and significant variables have a negative effect on CO2 emissions. Meanwhile, economic growth and population growth and energy consumption have a positive effect on carbon dioxide emissions in Indonesia. In conclusion, the oil price variable is a negative effect and significant to carbon dioxide while other variables such are economic growth, population and energy consumption showed the positive result of the increase of carbon dioxide in Indonesia.

Keywords: Energy, Consumption, Emissions, Subsidies, Economic.

Recibido: 20-12-2019 •Aceptado: 20-02-2020

Uso de energía, crecimiento económico, subsidios de energía, emisiones de CO_2 para el crecimiento de la población

Resumen

Este estudio examina la influencia del consumo de energía, el crecimiento económico, los subsidios energéticos, el crecimiento de la población en las emisiones de CO2 mediante el uso del Método de Momento Generalizado (GMM). Las pruebas de GMM descubrieron que los precios del petróleo y las variables significativas tienen un efecto negativo en las emisiones de CO2. Mientras tanto, el crecimiento económico y el crecimiento de la población y el consumo de energía tienen un efecto positivo en las emisiones de dióxido de carbono en Indonesia. En conclusión, la variable del precio del petróleo es un efecto negativo y significativo para el dióxido de carbono, mientras que otras variables como el crecimiento económico, la población y el consumo de energía mostraron el resultado positivo del aumento del dióxido de carbono en Indonesia.

Palabras clave: Energía, Consumo, Emisiones, Subsidios, Económico.

1. INTRODUCTION

Increased energy needs must have close links with the growing economic activities, as well as the increasing number of people in a country. Economic growth can increase incomes and ultimately increase demand for goods and services in an economy. Research related to energy, such as (ALSHEHRY & BELLOUMI, 2015; BILDIRICI, 2017). These include economic growth, CO2 emissions, government spending, investment, labor, and population. The above researches generally were studying the impact of different variables on

energy consumption which indicates an important role for economic growth.

Indonesia is one of the abundant countries in natural resources that are both renewable energy and non-renewable. However, the use of energy in Indonesia is more dominant exploiting fossil energy resources which certainly renewable while the source of renewable energy less utilized optimally. This led to the reserves of fossil energy, especially crude oil continues to thin, for that also Indonesia is a net importer of crude oil and its derivative products to date.

The utilization of fossil energy is cannot be taken apart from the importance of energy derived from fossil energy as a source of state income, the state national economic dependency on energy resources should be reduced in view of the energy reserves as a natural resource in Indonesia markedly continued to decline. The causality between energy consumption and income has been carried out by researchers in different countries surely is directly related to the growth, conservation, direct impact, and neutralization as research performed.

These environmental problems arise because of the use of energy derived from fossil material and certainly have an impact on global warming caused by greenhouse gases (CO2). Energy use has a close relationship with the development of CO2 levels and is closely related to the earth warming atmosphere also known as the greenhouse effect in which the contribution is increasing every year.

Along with the increase of economic activity and community economic as well as the increasing need for energy and population, it will increase the emissions of CO2 in the air, especially from the transportation sector and industries using fossil energy. The increase in fossil energy consumption will increase CO2 emissions in the air (ALAM, BEGUM, BUYSSE & HUYLENBROECK, 2012; ARVIN, PRADHAN & NORMAN, 2015; BEGUM, SOHAG, ABDULLAH & JAAFAR, 2015). In addition, energy is the most important factor in deciding the economic growth over the last few years so as to encourage high CO2 emissions, which will affect global warming. It will certainly have an impact on declining environmental quality in Indonesia (BASTOLA & SAPKOTA 2015; ALAM, MURAD, NOMAN & OZTURK, 2016).

The population growth in a country will give a direct impact on the number of emissions is continue to rise as the study. Research Jafari states that the impact of economic growth on high energy consumption directly contributes to the increased amount of CO2 emissions. Given the danger posed by a huge CO2 emission, so that the study of the influence of economic variables on CO2 emissions in Indonesia is very much important by in fact that as a developing country with the fourth largest population in the world then this problem is crucial. **(**MUZVIDZIWA, 2015).

2. THEORETICAL REVIEW

Prljic state that the role of the resources allocated properly, it will have a positive impact on the sustainability of economic growth

fluctuations is good for a country. Not only were many other factors that can increase economic growth as well as exports, investment and other factors (ALVARADO, INIGUEZ & PONCE, 2017). Economic growth can reduce poverty. Management and policy decision which will affect directly relevant to economic growth.

Population growth is a driven key of economic development, but in fact, these days, an increase in the population will have a great impact on the environment and demographic factors which have been the main factor that causes environmental problems, Wanget states that population growth is becoming one of the main factors in the increasing CO2 emissions. A high population means that the main factor increasing demand for increasing CO2 emissions is increasing demand for electrical energy, industry, and transport which resulted in a high in an increase in fossil fuel emissions. Depopulation can affect the growth of investments, especially those who depend on human resources. In contrast to research conducted by raucous the population, the shortage could impact the balance of emissions.

Research Mundaca consider that the impact of fuel subsidy reform on economic growth, mostly in the Middle East and the countries of North Africa shows countries that are initially subsidizing and ultimately eliminate or reducing half of the subsidy which will promote economic growth whereas the subsidies allocated to health spending, education, and public investment. This becomes a relevant example to be applied in Indonesia as also applied in India.

The research conducted by Koplow defines the energy subsidy as a financial contribution by the government, or government agency, which gives the advantage to subsidy recipients. Li states that the subsidies have become an important instrument of energy policy in many countries due to social and political issues, but is widely regarded as an economic disadvantage. Although the government provides a subsidy of energy there are still poor people who use other fuels. This is consistent with research Elinur which is found that the majorities of poor households in Indonesia consume non-commercial energy (firewood and charcoal), while richer households more depending on energy consumption such as gas, electricity, and kerosene that are commercial.

3. METHOD

The data used in this research is secondary data in the form of time-series data from 1990 to 2016, or a total of 27 samples. Variables used in this research is the emission energy consumption, economic growth, energy subsidies, population growth on CO2 emissions, then instrument variables in this study are oil prices and oil production. The model used in this study is the Generalized Method of Moment (GMM) (ARELLANO & BOND, 1991). The use of GMM with the consideration that a lot of variables that are intertemporal (nonlinear) fluctuate so that it complies with GMM models. The estimated model is expressed as follows:

$$CO2t = \beta 0 + \beta\ 1ECt\ 2GDPt\text{-}1 + \beta + \beta + \beta\ 3SEt\ 4GP + \varepsilon t(1)$$

Where EC is the energy consumption, GDP is economic growth SE is the energy subsidy GP is population growth and CO2 is carbon dioxide.

4. RESULTS AND DISCUSSIONS

This study uses six instruments that are variable energy subsidies, oil consumption, carbon dioxide, economic growth, oil prices, and oil production. Before the GMM models are used then there are some requirements that must be met. The first test of the instrument variables is using Cragg-Donald.

Table 1: Instrument Test Result

Crag-Donald F-Stat	TSLS Critical Value (relative bias)		Critical values (size)	
	Persen	Nilai	Persen	Nilai
9.105750	5 %	16.85	10%	24.58
	10%	10.27	15%	13.96
	20%	6.71	20%	10.26
	30%	5.34	25%	8.31
SIC-based	-5.368064			
HQIC-based	-3.600066			
Relevant MSC	-42.20795			

Source: Estimated Results, 2018.

The test results in Table 1 indicate that the F-statistic of Cragg-Donald is as much 9.105750 greater 20 percent (10.26) than the Stock-Yogo at so that these models can be used as an analysis model. Two, endogenous variables test with hypothesis formulation:

Ho: Exogenous variables

Ha: Endogenous variables

Table 2: Population Growth Endogenous Result Test

Difference in J-Stats	Value	df	Probability
	3.188706	1	0.0741

J-statistic summary:

	Value
Restricted J-statistic	4.314956
Unrestricted J-Statistic	1.126250

Source: Estimated Results,2018

If the p-value is less than 0.05 means Ha accepted. This means that there are endogenous variables, whereas exogenous. The test results are shown in Table 2, in which the difference j-stats value of 3.188706 and p-value 0.0741 means that population growth is an endogenous variable in this study. GMM models in this study are valid as evidenced by prob J-Stat 0.563231 shown in Table 3. Based on the earlier requirements that are the J-Stat the GMM models, they are eligible to be used in the analysis of the effect of energy consumption, economic growth, energy subsidies and population growth on CO2 emissions.

Table 3: GMM Estimation Result

Variables	**Coefficient**	**T-Stat**	**Prob**
Constanta	-348.6220	-2.517481	0.0200
GDP	0.0000229	3.029450	0.0064
GP(-1)	0.00000224	2.429841	0.0242
OP1	-618.8019	-4.304958	0.0003
EC	0.149820	3.020276	0.0065
Instrument Rank	7		
Prob J-Stat	0.563231		

Source: Estimated Results,2018

The test results in Table 3 show that economic growth positively and significantly at a rate of one percent level to CO2 means if economic growth increases by one percent, the CO2 will increase by 0.00002 percent, and conversely with ceteris paribus assumption. This shows that economic growth has a very significant influence on CO2 in Indonesia because Indonesia still relies on fossil fuels as the main energy source in the process of production, transportation, and consumption. High economic growth raises the environmental costs of the CO2 emissions generated from all economic sectors. The test results are consistent with research suggested by BORHAN, AHMED & HITAM (2012) which states that economic growth is positively related to carbon dioxide. Furthermore, there is the largest, Talbi found that the fuel consumption of the transport sector, as well as the industry, are the most dominant factors in increasing carbon dioxide.

The total population has a significant and positive effect at one percent level of the carbon dioxide it means that when economic

growth is increased by one percent, the carbon dioxide will increase by 0.000002 percent, and reversely. The more people, the more the needs and services to be produced, this condition affects the use of fossil energy in the process of production, transportation, and consumption, which is, in turn, will have a positive influence on CO2. Research supports that population growth has a positive relationship to carbon dioxide as the study conducted by (BEGUM ET AL, 2015).

Meanwhile, theoretically shows that the oil price is giving a negative effect on CO2 emissions. The results are consistent with the theoretical statements. The price of oil is also statistically significant. This study confirms the results of the study of Yang, research in China found that the oil price affects the amount of CO2 because basically, high oil prices have an impact on the reduction of the majority community activities using the machine in its activities. However, this will have an effect directly on the investors who are investing in the country (CAI, SAM & CHANG, 2017).

For final energy consumption have a positive and significant effect at one percent carbon dioxide. By the time the energy use is increased by one percent, the carbon dioxide will increase by 0.14 percent. Ozturk study in Latin America found that energy use in a positive impact on the increase of CO2. Zoundi found that long term renewable energy conducted in 25 countries in Africa were proven to reduce the amount of carbon dioxide produced. AKALPLER & SHINGIL (2017) found in their research that energy use is very influential on the long-term economic growth in China since its

government seeks to stabilize the impact of energy consumption which is fatal to the high CO2 emissions.

The same thing is done by Zoundi in assessing the relevance of the factors that are affecting the quality of the environment and the effectiveness of renewable energy in Africa. Need to diversify their energy, especially in eco-friendly energy (green economy) so that exhaust emissions are not too large.

Liu found that environmental pollution from burning fossil fuels would harm the health, air quality, water, agriculture, and ultimately have an impact economy of the concerned country. Cities in China are among the most polluted in the world level. Indonesia as a country that has ratified by the Kyoto protocol, which is necessary to inform the situation of CO2, emissions and the concentration of CO2 tends to increase and continue to fluctuate. However, Indonesia still has a CO2 gas absorption from forests and oceans. CO2 emissions in Indonesia

5. CONCLUSIONS

Endogeneity test results obtained population variable is an endogenous variable, while energy subsidies, oil consumption, carbon dioxide, economic growth, oil prices, and oil production are instruments variable with indicated J-stat prob validity result value 0.563231. GMM test results showed that the oil price variable is the negative effect and significant to carbon dioxide while other variables

such are economic growth, population and energy consumption showed the positive result to the increase of carbon dioxide in Indonesia. Mountinho showed similar results are a positive relationship between economic growth and CO2 emissions.

These results indicate that the economic variables have a significant effect both in theory and statistics and research suggested that the increased of eco-friendly energy (green economy) is need, as the condition of economic growth is now increased a higher emission, and therefore the government must socialize as application in the developing countries about the eco-friendly economy in order to reduce the rate of the wasted gas emissions. One of the ways is to improve mass transport, certainly will reduce the use of personal transportation. Researchers further expected that the sustainability of the additional variables along with the economic growth so that further research will be continued in both long and short term analysis.

The weakness of this study is that the energy used in this study is the energy in general when there is one of the most dominant energies used today is energy derived from coal. Furthermore, the presence of the new price of renewable energy so there is no substitution effect from fossil energy to renewable energy.

REFERENCES

AKALPLER, E., & SHINGIL, M. 2017. "Statistical reasoning the link between energy demand, CO2 emissions and growth: Evidence from China". **Procedia Computer Science**. Vol. 120, pp. 182-188. Netherlands.

ALAM, M., BEGUM, I., BUYSSE, J., & HUYLENBROECK, G. 2012. "Energy consumption, carbon emissions and economic growth nexus in Bangladesh: Cointegration and dynamic causality analysis". **Energy Policy**. Vol. 45, pp. 217-225. Netherlands.

ALAM, M., MURAD, M., NOMAN, A., & OZTURK, I. 2016. "Relationships among carbon emissions, economic growth, energy consumption and population growth: Testing Environmental Kuznets Curve hypothesis for Brazil, China, India and Indonesia". **Ecological Indicators**. Vol. 70, pp. 466-479. Netherlands.

ALSHEHRY, A., & BELLOUMI, M. 2015. "Energy consumption, carbon dioxide emissions and economic growth: The case of Saudi Arabia". **Renewable and Sustainable Energy Reviews**. Vol. 41, pp. 237-247. Netherlands.

ALVARADO, R., INIGUEZ, M., & PONCE, P. 2017. **Foreign direct investment and economic growth in Latin America**. Economic Analysis and Policy. Pp. 1-32. Netherlands.

ARELLANO, M., & BOND, S. 1991. "Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations". **The Review of Economic Studies**. Vol. 58, pp. 227-297. UK.

ARVIN, M., PRADHAN, R., & NORMAN, N. 2015. "Transportation intensity, urbanization, economic growth, and CO2 emissions in the G-20 countries". **Emissions in the G-20 countries**. Vol. 35, pp. 50-66. UK.

BASTOLA, U., & SAPKOTA, P. 2015. "Relationships among energy consumption, pollution emission, and economic growth in Nepal". **Energy**. Vol. 80, pp. 254-262. Netherlands.

BEGUM, R., SOHAG, K., ABDULLAH, S., & JAAFAR, M. 2015. "CO2 emissions, energy consumption, economic and population growth in Malaysia". **Renewable and Sustainable Energy Reviews**. Vol. 41, pp. 594-601. Netherlands.

BILDIRICI, M. 2017. "The effects of militarization on biofuel consumption and CO2 emission". **Journal of Cleaner Production**. Vol. 152, pp. 420-428. Netherlands.

BORHAN, H., AHMED, E., & HITAM, M. 2012. "The Impact of Co2 on Economic Growth in ASEAN 8". **Procedia - Social and Behavioral Sciences**. Vol. 35, pp. 389-397. Netherlands.

CAI, Y., SAM, C., & CHANG, T. 2017. **Nexus between clean energy consumption, economic growth and CO2 emissions**. Cleaner Production. pp. 1-33. Netherlan **.**

MUZVIDZIWA, I. 2015. "Women Educational Leaders and the Empowerment of Others1". **Journal of Sociology and Social Anthropology.** Vol. 6, N^{o} 3: 365-376.

UNIVERSIDAD DEL ZULIA

opción
Revista de Ciencias Humanas y Sociales

Año 36, Especial N° 26 (2020)

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.
Maracaibo - Venezuela

www.luz.edu.ve

www.serbi.luz.edu.ve

produccioncientifica.luz.edu.ve