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Integration Of Green Monetary and Green Fiscal Policies In Supporting The Effectiveness Of Economic Transformation Towards Sustainable Development in Indonesia

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Abstract*This research aims to determine Renewable Energy, Emission Intensity, Life Expectancy, and Unemployment Rate on Gross National Income (GNI) in Estonia, Finland, Germany, Hungary, and Norway. The variables in this research are Renewable Energy, Emission Intensity, Life Expectancy, and Unemployment Rate as independent variables, while the Gross National Income variable is the dependent variable. This research uses secondary data taken from the OECD from 2011-2023. The data analysis technique used is the Autoregressive Distributed Lag (ARDL) panel. The research results from the ARDL model analysis show that the country that is able to become a leading indicator for the stability of the GNI rate is only Norway. This is because all the variables or indicators in the research, namely (Renewable Energy, Life Expectancy, and Unemployment Rate), this country has a significant effect on GNI. while the Emission Intensity variable does not have a significant effect on GNI. If we look at the stability of the short run and long run, the Unemployment Rate variable, both in the short and long term, significantly controls the stability of GNI.*

Keywords*: Renewable Energy, Emission Intensity, Life Expectancy, Unemployment Rate, Gross National Income*

INTRODUCTION

A worldwide consensus has emerged that the current challenge for policymakers is to combine economic growth or recovery 3 with ecological transition to combat climate change and achieve the PCA goal of limiting global warming to below 2°C. In this regard, this study proposes an integrated framework using a two-sector dynamic stochastic general equilibrium (DSGE) model with financial intermediaries to evaluate the impact of fiscal and monetary policies targeting environmental objectives, which we define as "green policies", on the economy and pollution level. Namely, we analyze the impact of green monetary policy 4 and fiscal instruments. We examine unconventional monetary policies that support the green sector, hereinafter referred to as green quantitative easing (GQE). Examples of this unconventional green monetary policy are the purchase of "green corporate bonds" by central banks (or reduced discounts of "green corporate bonds" as collateral when the central bank provides liquidity to the financial system), and the provision of targeted credit. through short-term corporate facilities for companies involved in the low-carbon transition. We also examine the potential impact of three types of fiscal instruments, namely subsidies for the purchase of environmentally friendly goods, carbon taxes on polluting companies, and implicit taxes on bank loans to the brown sector. The implicit tax on brown loans refers to the additional costs incurred by commercial banks when financing the brown sector due to limited access to

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liquidity. Examples include increased prudential requirements on commercial banks that are not climate sensitive, and increased risk weighting of commercial banks' assets when the issuer is not involved in the low-carbon transition(Benkhodja et al., 2023).

Environmentally friendly monetary policies are not enough to overcome pollution problems, especially reducing emissions from polluting companies. There is even a risk of increasing prices of environmentally friendly goods, thereby reducing consumer demand. Fiscal policies, such as subsidies for environmentally friendly consumption and carbon taxes, are 5 effective instruments for reducing emissions and pollution levels. 6 In addition, although carbon taxes can suppress the growth of the chocolate sector, they also have a positive impact on the development of the environmentally friendly sector, because environmentally friendly goods become relatively cheaper, thereby increasing demand from consumers.

Fiscal policies in energy conservation and emission reduction and clarifying the path through which fiscal policies encourage green and low-carbon transformation to encourage energy conservation and emission reduction in cities. In addition, it also increases the use of the Difference-in-Differences method in evaluating the impact of policies in scenarios such as overlapping implementation of pilot policies and policy withdrawal(Sun & Feng, 2023).

The impact of environmental protection and energy saving as well as green financial mechanisms have been widely discussed. In effect, green financing can effectively reduce the ecological footprint, change the energy consumption structure of the economy, and then reduce the carbon emissions of the entire economy, supporting sustainable economic development(Mingzhong et al., 2024).

LITERATURE REVIEW

Renewable Energy (Renewable Energy)

Renewable energy is energy that comes from sustainable natural processes such as water, sun, wind, geothermal heat, sea waves, and so on. Utilization and development of renewable energy is an alternative and solution for protecting the environment, saving fossil-based energy (oil and natural gas), and minimizing negative environmental impacts such as air pollution, increasing air temperature, and thinning of the ozone layer. Indonesia has enormous potential to develop and develop renewable energy. This is due to Indonesia's hilly topography with many rivers and several areas that have lakes, reservoirs and dams that can be used to produce energy.(Young et al., 2019).

Emission Intensity (Emission Intensity)

Emission intensity is used to obtain estimates of air pollutant or greenhouse gas emissions based on the amount of fuel burned, number of animals on a farm, industrial production levels, distance traveled or similar activity data. Emission intensity can also be used to compare the environmental impacts of different fuels or activities. Due to the rapid increase in carbon emissions, the global greenhouse effect is getting worse, and extreme weather conditions occur frequently, posing serious threats to the ecological environment and human health. Limiting the continued growth of carbon emissions is not only a necessity for environmentally friendly economic recovery but also a requirement for sustainable development of human society. Carbon emissions mainly come from the building, industrial and transportation sectors(Gan et al., 2022).

Life Expectancy (Life Expectancy)

Life Expectancy (AHH) is a tool to measure government performance in improving general welfare and the health status of the population in particular. Life expectancy shows the average age a person attains under appropriate mortality conditions in their society. A low life expectancy rate in an area indicates that health development has not been successful, and a high life expectancy rate indicates that health development in that area has been more successful.(Young et al., 2019).

Unemployment Rate (Unemployment)

According to the Central Statistics Agency (BPS), employment indicators consist of people who are not working but are looking for work or are preparing a new business, people who have been hired but have not yet started working, people who are not working but want to look for work, and people who are not working but want to find a job. The unemployment rate is widely considered to be one of the most important macroeconomic indicators and an important factor in estimating employment success(Jo et al., 2023).

Types of unemployment such as those who are temporarily laid off can recover more quickly than unemployment in general. Most people who are laid off will be recalled, so the time-consuming search and match process that usually hinders a speedy recovery can be avoided(Hall & Kudlyak, 2022). One of the many theories that discusses unemployment theory in Indonesia is the classical theory. Classical theory holds that unemployment is caused by a temporary misallocation of resources. However, the price mechanism in a free market guarantees that all supply will be absorbed by demand.

Gross National Income (gross national income)

The ability to increase national income can be seen from increasing gross domestic product, gross national product, or the size of national income. If this increase occurs every

year, it can be said that the country has quite good economic performance. However, aggregate measures of national income are not the only way to assess a nation's economic achievements(Firdaus, 2012).

When the economy develops sustainably, GNI per capita will continue to increase. Over the past five decades, from the 1970s to the 2010s, many low-income countries grew into middle-income countries, and many middle-income countries managed to break through these barriers and join the group of high-income countries. It seems that all economies experienced growth in this period; however, some experience faster growth than others, and some enjoy smoother development than others(Yang, 2019).

RESEARCH METHODS

Data Types and Sources

The data that will be used in this research is secondary data, namely data obtained indirectly from the original source, such as data obtained from citing books, journals and other sources that are related and have relevance to the research theme. Data used from 2011-2023. The type of secondary data used in this research comes from the OECD (https://data.oecd.org/).

Analysis Method

This research uses the ARDL panel method together with Eviews for analysis, namely data between time and between countries. Estimation results for each individual characteristic were obtained through the use of panel regression.

Panel Regression Testing with the formula:

$$GNIit=\alpha+\beta_1 REt+\beta_2 EIit+\beta_3 LEit+\beta_4 URit+e$$

The following is the panel formula by country:

$$GNIestonia\ it=\alpha+\beta_1 REt+\beta_2 EIit+\beta_3 LEit+\beta_4 URit+e$$

$$GNIFinland\ it=\alpha+\beta_1 REt+\beta_2 EIit+\beta_3 LEit+\beta_4 URit+e$$

$$GNIGermany\ it=\alpha+\beta_1 REt+\beta_2 EIit+\beta_3 LEit+\beta_4 URit+e$$

$$GNIHungary\ it=\alpha+\beta_1 REt+\beta_2 EIit+\beta_3 LEit+\beta_4 URit+e$$

$$GNINorway\ it=\alpha+\beta_1 REt+\beta_2 EIit+\beta_3 LEit+\beta_4 URit+e$$

RESULTS AND DISCUSSION

Using Eviews 10 software, panel analysis with Auto Regressive Distributin Lag (ARDL) tests combined data, namely a combination of cross section data (country) and time series data (yearly). The ARDL panel results are better than ordinary panels because they are

able to be cointegrated in the long term and have a lag distribution that best fits theory. The results are as follows:

Dependent Variable: D(GNI)
Method: ARDL
Date: 05/02/24 Time: 15:39
Sample: 2012 2023
Included observations: 52
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): RE EI LE UR
Fixed regressors: C
Number of models evaluated: 1
Selected Model: ARDL(1, 1, 1, 1, 1)
Note: final equation sample is larger than selection sample

Variables	Coefficient	Std. Error	t-Statistics	Prob.*
Long Run Equation				
RE	0.232890	0.186518	1.248623	0.2225
EI	5.136598	4.991501	1.029069	0.3126
LE	-1.097089	0.245045	-4.477092	0.0001
U.R	20.11156	2.824453	7.120512	0.0000
Short Run Equation				
COINTEQ01	-0.291181	0.212224	-1.372043	0.1813
D(RE)	2.245036	2.132131	1.052954	0.3017
D(EI)	37.70181	40.13066	0.939476	0.3558
D(LE)	2.263310	1.429078	1.583756	0.1249
D(UR)	-2.703446	1.091344	-2.477172	0.0198
C	-4991168.	3639109.	-1.371536	0.1815

Mean dependent var	-1028.154	SD dependent var	7057.532
SE of regression	5423.675	Akaike info criterion	15.22547
Sum squared resid	7.94E+08	Schwarz criterion	16.40203
Log likelihood	-430.3770	Hannan-Quinn Criter.	15.68658

*Note: p-values and any subsequent tests do not account for model selection.

Source: Eviews Output, 2024

With the main assumption that the coefficient value has a negative slope with a significance level of 5%, the ARDL Panel model used in this research is accepted. The results shown above indicate that the conditions for this model are met, with a negative value of -0.29 and a significant value of 0.005, with a prob value of less than 0.05. Therefore, the ARDL Panel model used in this study is considered feasible. Based on model requests, the analysis was performed on a panel from each of the following countries:

Country Panel AnalysisEstonia

Variables	Coefficient	Std. Error	t-Statistics	Prob. *
COINTEQ01	-1.072335	0.025912	-41.38401	0.0000
D(RE)	-0.252462	0.032415	-7.788421	0.0044
D(EI)	-8.206615	45.44735	-0.180574	0.8682
D(LE)	0.722097	0.033771	21.38189	0.0002
D(UR)	-2.122645	60.28708	-0.035209	0.9741
C	-18389025	3.05E+13	-6.02E-07	1,0000

Source: Eviews Output, 2024

The ARDL Panel test results per country show that:

- **RE**

  RE significantly affects GNI. This can be seen in the probability value sig 0.00 > 0.05 where RE has an effect on GNI.

- **EI**

  EI does not significantly affect GNI. This can be seen in the probability value sig 0.86 > 0.05 where EI has no effect on GNI.

- **LE**

  LE significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where LE has an effect on GNI.

- **U.R**

  UR does not significantly affect GNI. This can be seen in the probability value sig 0.97 > 0.05 where UR has no effect on GNI.

Finland Country Panel Analysis

Variables	Coefficient	Std. Error	t-Statistics	Prob. *
COINTEQ01	0.020104	9.22E-05	218.1076	0.0000
D(RE)	0.003644	3.79E-05	96.19637	0.0000

D(EI)	0.148470	0.071677	2.071366	0.1301
D(LE)	0.037835	0.155685	0.243025	0.8237
D(UR)	-0.525230	0.050776	-10.34403	0.0019
C	345439.5	2.74E+10	1.26E-05	1,0000

Source: Eviews Output, 2024

The ARDL Panel test results per country show that:

- **RE**

  RE significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where RE has an effect on GNI.

- **EI**

  EI does not significantly affect GNI. This can be seen in the probability value sig 0.13 > 0.05 where EI has no effect on GNI.

- **LE**

  LE does not significantly affect GNI. This can be seen in the probability value sig 0.82 > 0.05 where LE has no effect on GNI.

- **U.R**

  UR significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where UR has an effect on GNI.

Germany Country Panel Analysis

Variables	Coefficient	Std. Error	t-Statistics	Prob. *
COINTEQ01	0.002581	0.000171	15.12068	0.0006
D(RE)	1.215463	0.131144	9.268144	0.0027
D(EI)	-0.251686	0.208735	-1.205772	0.3143
D(LE)	0.340346	0.405621	0.839074	0.4630
D(UR)	-3.202417	0.478493	-6.692712	0.0068
C	44208.31	5.00E+10	8.84E-07	1,0000

Source: Eviews Output, 2024

The ARDL Panel test results per country show that:

- **RE**

  RE significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where RE has an effect on GNI.

- **EI**

EI does not significantly affect GNI. This can be seen in the probability value sig 0.31 > 0.05 where EI has no effect on GNI.

- **LE**

  LE does not significantly affect GNI. This can be seen in the probability value sig 0.46 > 0.05 where LE has no effect on GNI.

- **U.R**

  UR significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where UR has an effect on GNI.

Hungary Country Panel Analysis

Variables	Coefficient	Std. Error	t-Statistics	Prob. *
COINTEQ01	-0.417459	0.064025	-6.520282	0.0073
D(RE)	10.69527	156.3636	0.068400	0.9498
D(EI)	198.1097	22721.68	0.008719	0.9936
D(LE)	7.719010	294.2817	0.026230	0.9807
D(UR)	-1.010725	194.5971	-0.005194	0.9962
C	-7148878.	2.16E+13	-3.31E-07	1,0000

Source: Eviews Output, 2024

The ARDL Panel test results per country show that:

- **RE**

  RE does not significantly affect GNI. This can be seen in the probability value sig 0.94 > 0.05 where RE has no effect on GNI.

- **EI**

  EI does not significantly affect GNI. This can be seen in the probability value sig 0.99 > 0.05 where EI has no effect on GNI.

- **LE**

  LE does not significantly affect GNI. This can be seen in the probability value sig 0.98 > 0.05 where LE has no effect on GNI.

- **U.R**

  UR does not significantly affect GNI. This can be seen in the probability value sig 0.99 > 0.05 where UR has no effect on GNI.

Norway Country Panel Analysis

Variables	Coefficient	Std. Error	t-Statistics	Prob. *
COINTEQ01	0.011206	0.001513	7.406639	0.0051
D(RE)	-0.436733	0.010901	-40.06383	0.0000
D(EI)	-1.290770	0.849791	-1.518925	0.2261
D(LE)	2.497263	0.226209	11.03960	0.0016
D(UR)	-6.656215	0.521956	-12.75244	0.0010
C	192417.0	4.45E+11	4.33E-07	1,0000

Source: Eviews Output, 2024

The ARDL Panel test results per country show that:

- **RE**

  RE significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where RE has an effect on GNI.

- **EI**

  EI does not significantly affect GNI. This can be seen in the probability value sig 0.22 > 0.05 where EI has no effect on GNI.

- **LE**

  LE significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where LE has an effect on GNI.

- **U.R**

  UR significantly affects GNI. This can be seen in the probability value sig 0.00 < 0.05 where UR has an effect on GNI.

The leading indicators of the country's effectiveness in controlling GNI stability are Estonia Renewable Energy (RE) and Life Expectancy (LE). Finland and Germany control GNI stability by Renewable Energy (RE) and Unemployment Rate (UR). Meanwhile, Norway controls stability by Renewable Energy (RE), Life Expectancy (LE), and Unemployment Rate (UR). In research in several countries, countries with high levels of life expectancy are countries with fairly high national incomes. Therefore,Improving life expectancy can increase national income which can then reflect good economic growth.

Then overall, in the long term, it turns out that Life Expectancy (LE) and Unemployment Rate (UR) influence GNI, while in the short term what influences GNI stability is the Unemployment Rate (UR).

CONCLUSION

Based on the data analysis that has been carried out, the following conclusions can be drawn:

a. The results of the panel analysis of countries capable of leading indicators for GNI are Norway, where control of GNI stability is carried out by all variables (Renewable Energy, Life Expectancy and Unemployment Rate) except Emission Intensity, this country has a significant effect on GNI. Finland and Germany control GNI by Renewable Energy and Unemployment Rate. Meanwhile, Estonia controls GNI by Renewable Energy and Life Expectancy.
b. The main leading indicator of variable effectiveness in controlling GNI stability is Renewable Energy (RE), where the countries Estonia, Finland, Germany and Norway have a significant influence in controlling GNI stability.
c. Then overall in the long term (Long Run) it turns out that Life Expectancy (LE) and Unemployment Rate (UR) influence GNI, while in the short term (Short Run) what influences GNI stability is the Unemployment Rate (UR).

BIBLIOGRAPHY

Benkhodja, M.T., Ma, X., & Razafindrabe, T. (2023). Green Monetary and Fiscal Policies: The Role of Consumer Preferences. Resource and Energy Economics, 73, 3.

Djamila, R. (2023). Hybrid Photovoltaic-Wind Power Systems. 1–2.

Paradise. (2012). Analysis of Income, Growth and National Economic Structure. Plano Civil Journal, 1(1), 63–73.

Gan, L., Liu, Y., Shi, Q., Cai, W., & Ren, H. (2022). Regional inequality in the carbon emission intensity of public buildings in China. Building and Environment, 225(November), 1–6.

H. Tulchinsky, T., A. Varavikava, E., & J. Cohen, M. (2023). Chapter 3 - Measuring, Monitoring, and Evaluating the Health of a Population. The New Public Health (Fourth Edition).

Hall, R. E., & Kudlyak, M. (2022). The unemployed with jobs and without jobs. Labor Economics, 79(December), 1–7.

J. Tetzlaff, M. Luv, J. Epping, S. Gever, J. Beller, J. T. Stahmever, S. Sperlich, & F. Tetzloff. (2022). Estimating trends in working life expectancy based on health insurance data from Germany – Challenges and advantages. SSM - Population Health, 19, 1–16.

Jo, C., Kim, D.H., & Lee, J.W. (2023). Forecasting unemployment and employment: A system dynamics approach. Technological Forecasting and Social Change, 194(September), 1–21.

Lin, TY, Chiu, YH, Lin, YN, Chang, TH, & Lin, PY (2023). Greenhouse gas emission indicators, energy consumption efficiency, and optimal carbon emission allowance allocation of the EU countries in 2030. Gas Science and Engineering, 110(February), 1–7.

Mingzhong, H., Zhe, L., Yudong, Z., & Xiaobei Wei. (2024). Does green finance promote green transformation of the real economy. International Business and Finance, 67, 1–5.

Young, R., Koleangan, R., & Kalangi, J.B. (2019). The influence of life expectancy, education level and per capita expenditure on economic growth in North Sulawesi in 2003-2017. Efficiency Scientific Periodical Journal, 19(01), 44–55.

Sun, L., & Feng, N. (2023). Research on fiscal supporting green and low-carbon transition to promote energy conservation and emission reduction policies in cities_ Empirical evidence from China. Journal of Cleaner Production, 430, 1–6.

Yang, F. (2019). The impact of financial development on economic growth in middle-income countries. Journal of International Financial Markets, Institutions and Money, 89, 74–89.