

THE MODERATING EFFECTS OF THE BANKING AND FINANCIAL SECTOR IN ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH ECONOMIC GROWTH, ENERGY CONSUMPTION, AND DECARBONIZATION: DYNAMIC PANEL ESTIMATION FOR THE WESTERN BALKANS

Worked by: Prof. Dr. Güngör Turan

Msc. Vangjel Toto

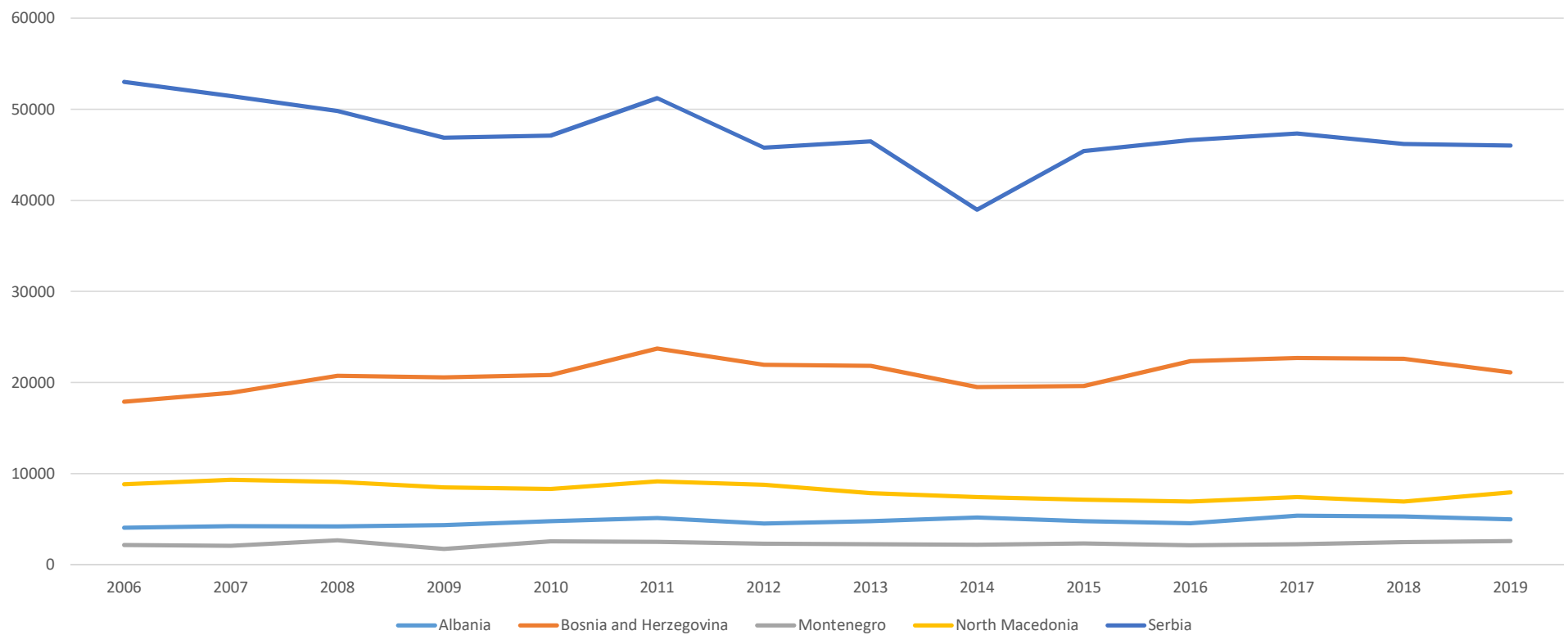
Research Questions

- Is the EKC hypothesis valid for the selected WB countries when moderating effects such as banking industry and financial development are taken into consideration?

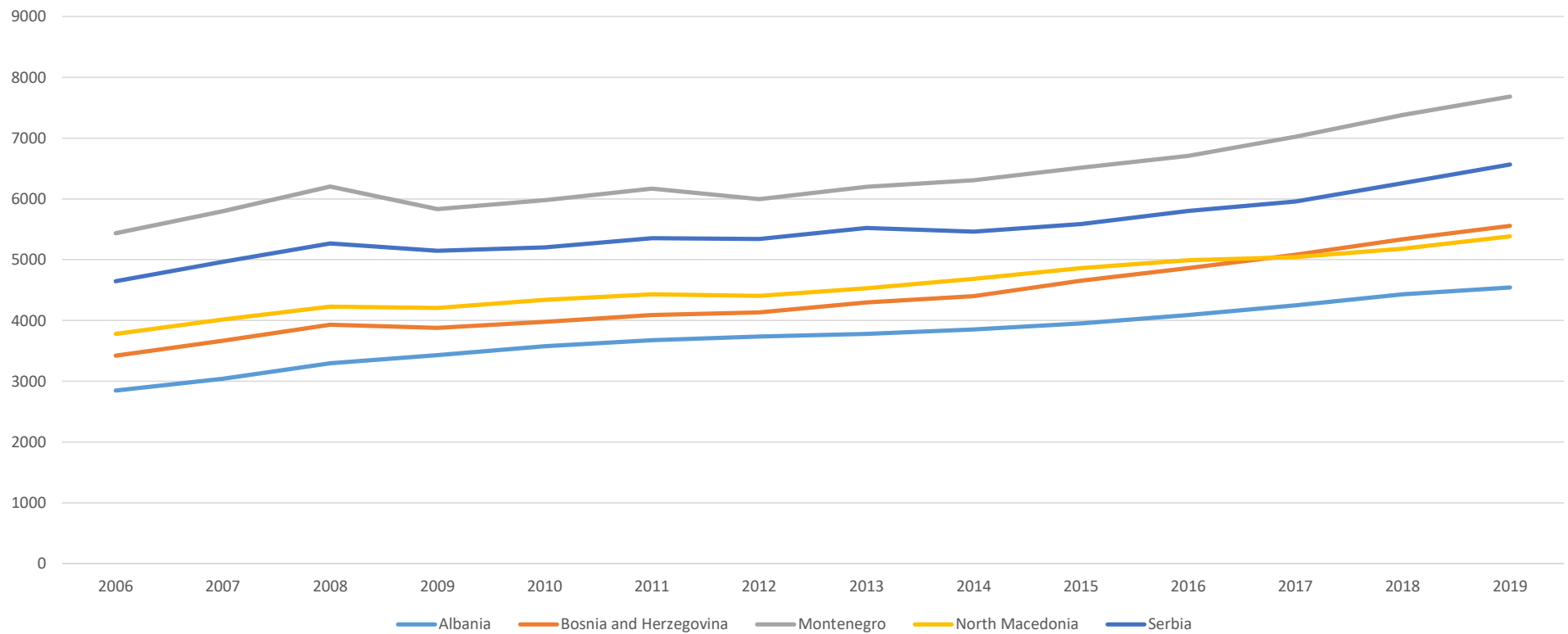
Theoretical Literature Review

- The concept of the EKC hypothesis was first elaborated by Simon Kuznets in 1955 (Ster, 2004). It is a simple theory that shows the relationship between inequality and income which are expected to have an inverse U-shape along the development process, initially increasing with industrialization and then falling, as more and more workers join the high – productivity sectors of the economy (Kuznets, 1955).
- For the first time, the relationship between economic growth and environmental degradation has been analyzed in the seminal paper of Grossman & Krueger (1991) with the main aim of determining the potential effects of the NAFTA agreement.

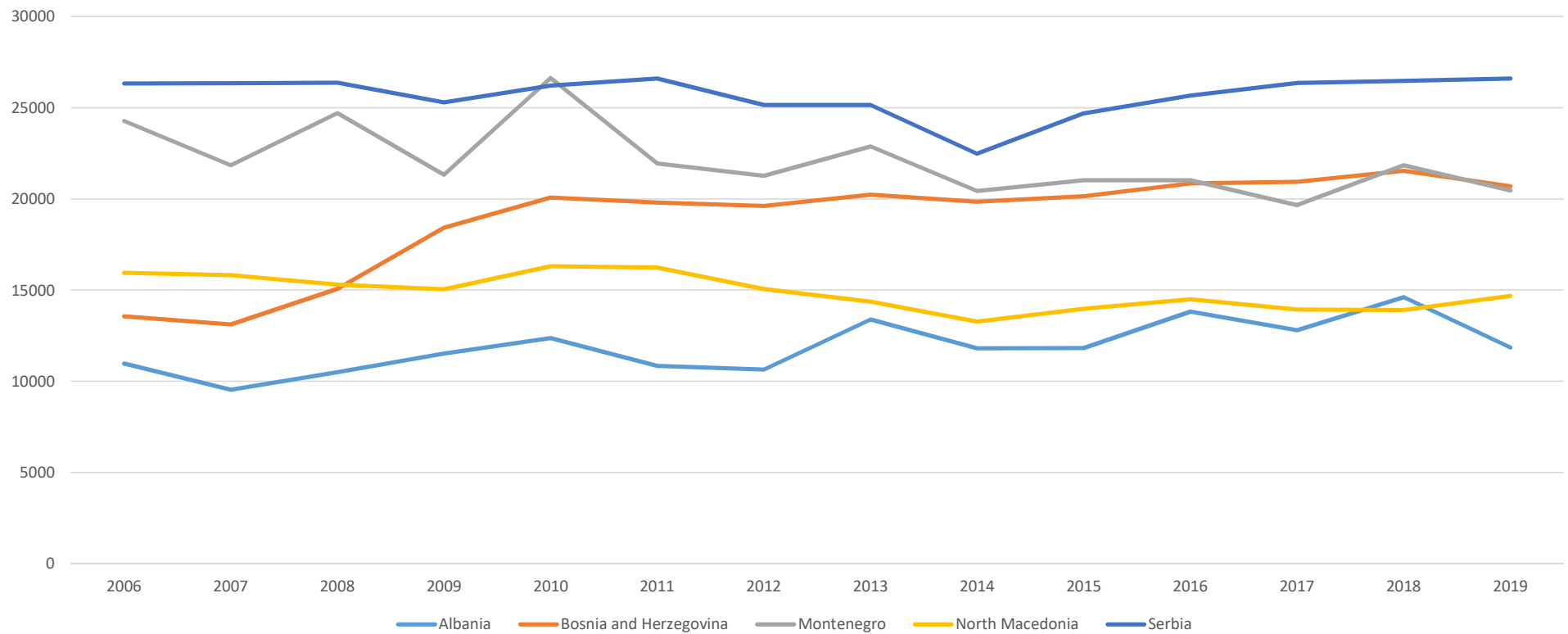
CO2 Emission



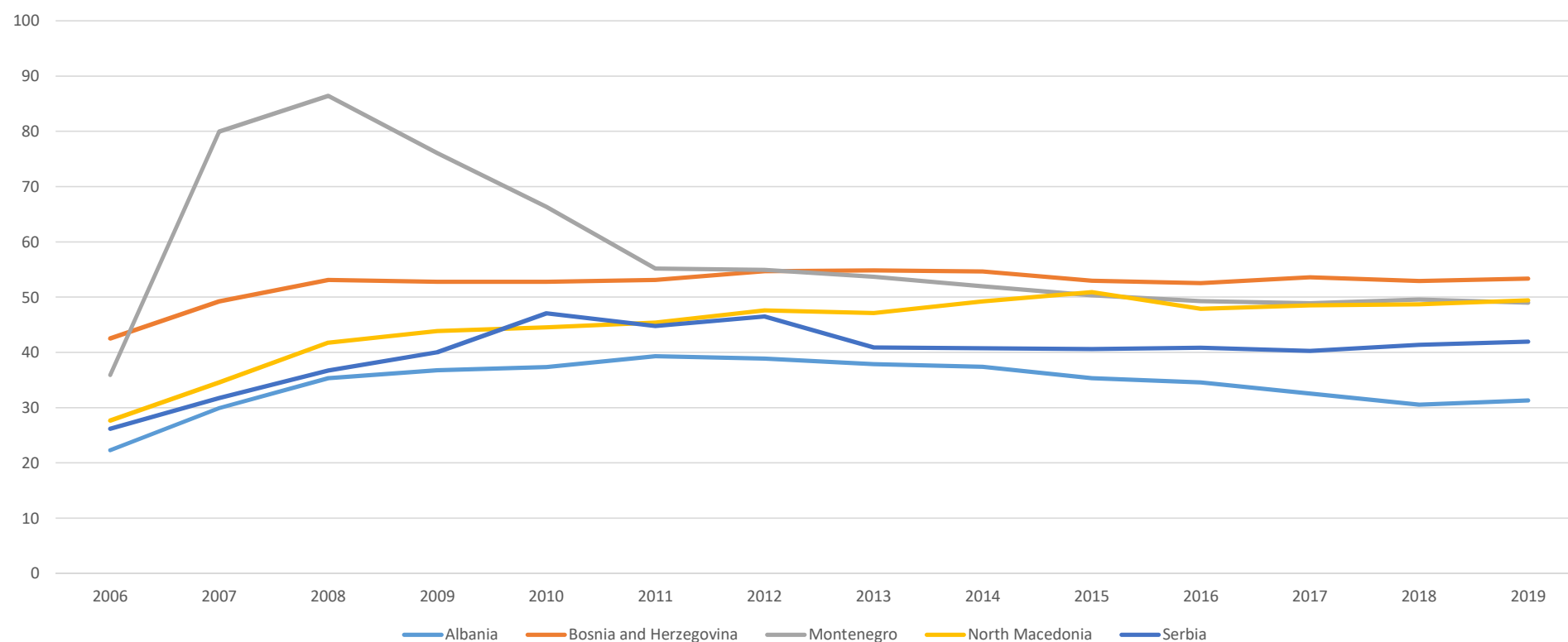
GDP per capita



Energy Consumption



Banking and Financial Development



Methodology

Time Period: 2006 – 2019

Countries: Albania, Bosnia & Herzegovina, Montenegro, North Macedonia, Serbia

Techniques: PMG/ARDL estimation technique – AMG

Variables & Model

$$CO2_t = f(GDP_t, ENE_t, BANK_t) \quad (1)$$

$$LCO2_t = \alpha_0 + \beta_1 LGDP_t + \beta_2 LENE_t + \beta_3 LBANK_t + \varepsilon_t \quad (2)$$

$$Y_{it} = \sum_{j=1}^p \varphi_{i,j} Y_{i,t-j} + \sum_{j=0}^q \delta_{i,j} X_{i,t-j} + \vartheta_i + \epsilon_{jt}$$

Correlation

	LCO2	LENE	LGDP	LBANK
LCO2	1	0.4194	-0.057	-0.1617
LENE	0.4194	1	0.7422	0.3735
LGDP	-0.057	0.7422	1	0.4887
LBANK	-0.1617	0.3735	0.4887	1

CSDs Test for Residuals

Test	Statistic	Prob.
Breusch - Pagan LM	8.938	0.53
Pesaran Scaled LM	-1.196	0.23
Pesaran CD	2.392	0.01

H0: No cross-section dependence (correlation) in residuals

Ha: Cross-section dependence (correlation) in residuals

CSDs Test for Variables

Variable	CD-test	p-value
LCO2	0.56	0.575
LGDP	11.483	0.000
LENE	0.453	0.651
LBANK	7.253	0.000

H0: Cross-section independence (correlation) in variables

Ha: Cross-section dependence (correlation) in variables

Slope Homogeneity Test & HAC Test

	Delta	p-value
	3.468	0.00
Adj.	4.325	0.00

	Delta	p-value
	3.468	0.00
Adj.	4.325	0.00
	Delta (HAC)	p-value
	0.305	0.76
Adj.	0.381	0.70

H0: Slope coefficients are homogenous

Ha: Slope coefficients are heterogeneous

Unit Root Test - 1st generation

	Level		First Difference	
Variables & Test Type	Intercept	Intercept + Trend	Intercept	Intercept + Trend
Maddala and Wu (1999)				
LCO2	0.00***	0.00***	0.02**	0.10
LGDP	0.77	0.24	1.00	0.14
LENE	0.02**	0.00***	0.00***	0.00***
LBANK	0.00***	0.00***	0.00***	0.00***
Pesaran (2007) CIPS				
LCO2	0.02**	0.00***	0.44	0.40
LGDP	0.07*	0.36	0.39	0.53
LENE	0.51	0.33	0.69	0.49
LBANK	0.23	0.16	0.02**	0.23

Unit Root Test – 2nd generation

Variables	CIPS
dLCO2	-4.863***
dLGDP	-2.308*
dLENE	-3.335***
dLBANK	-3.834***

***, **, * denotes rejection of the null hypothesis at the 1%, 5% and 10% levels of interval confidences

Cointegration Test

	Statistic	p-value	
Pedroni test for Cointegration			
Modified Phillips-Perron t	2.0260	0.02	
Phillips-Perron t	-7.1407	0.00	
Augmented Dickey-Fuller t	-5.1620	0.00	
Kao test for Cointegration			
Modified Dickey-Fuller t	-3.1103	0.00	
Dickey-Fuller t	-5.2887	0.00	
Augmented Dickey-Fuller t	-3.2553	0.00	
Unadjusted modified Dickey-Fuller t	-7.5764	0.00	
Unadjusted Dickey-Fuller t	-6.7141	0.00	
Westerlund test for Cointegration			
Variance ratio	-1.3057	0.09	

H0: No cointegration of panels

Ha: All panels are cointegrated

AMG & AMG ECM Estimation

		Coefficient	p-value
	Augmented Mean Group Estimators		
LR	LGDP	1.3036	0.00
	LENE	0.7785	0.00
	LBANK	-0.0622	0.00
SR	Error correction form	-0.0712	0.56
	LGDP	1.1987	0.00
	LENE	0.7798	0.00
	LBANK	-0.3318	0.00

Results of the Dimitrescu and Hurlin Panel Causality Test

Variable	p-value
GDP	0.00
ENE	0.00
BANK	0.92

Results & Conclusions

- In the long term, the results from the AMG estimators have proven that the EKC hypothesis is valid for WBs. The findings demonstrate that WB countries, as part of the developing world, exhibit the presence of the EKC hypothesis. Moreover, findings indicate that non-renewable energy impacts carbon emissions, and the development of the banking and financial sectors contributes to environmental sustainability through their significant negative impact on carbon emissions. This paper concludes that a robust banking and financial sector may moderate the adverse effects of economic growth and energy consumption on the environment in promoting sustainable development in the WBs.

Policy Recommendations

- Introducing a carbon emission taxing system and carbon emissions trading scheme is vital for environmental sustainability and economic efficiency. The carbon emission trading scheme is crucial for the WBs to join the EU-initiated Green Agenda. There are recommendations from the reports of the EU Commission (2023) suggesting to take action to join the EU Emissions Trading System and prepare for the EU Carbon Border Adjustment Mechanism.

- It is essential to encourage energy efficiency and devise energy consumption strategies. Additional taxes should be imposed on new investments that rely on non-renewable energy sources for their energy consumption.
- Enforce the development of banking and financial institutions to fund only applications that utilize green and clean energy sources. In addition, banks and financial institutions should increase their provision of loans to consumers and businesses interested in investing in renewable energy-generating plants.
- Policymakers could pay attention to developing the appropriate rules and conditions to establish stock markets in the region where such financial institutions are lacking.

Thank you!