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The Impacts of Globalization, Economic Growth, Population and Urbanization on Carbon Dioxide Emissions in Afghanistan

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ABSTRACT

The atmospheric carbon dioxide emissions have increased since last few years in Afghanistan. This increasing trend in carbon emissions may cause global warming, climate change and environmental pollution. Consequently, these indicated threats may suffer human life and ecological conditions in near future. Therefore, this study examines the impacts of globalization, economic growth, population and urbanization on carbon emissions in Afghanistan using annual time series data for the period 1990 – 2020. The study used the Augmented Dickey Fuller and Phillips–Perron unit root tests, the Breusch – Godfrey serial correlation Lagrange multiplier (LM) test and the autoregressive distributed lag (ARDL) bounds test to examine the short and long-run relationship of globalization, economic growth, population and urbanization with carbon emissions. The empirical results show that globalization, economic growth and population have a significant positive short and long-run relationship with carbon emissions. While urbanization has a significant short-run negative and long-run positive relationship with carbon emissions. Based on results, it is highly recommended that government should design environment friendly policies related to globalization, economic growth, population and urbanization to reduce environmental pollution in Afghanistan.

Keywords: Globalization, Economic growth, Population, Urbanization, Carbon dioxide emissions

INTRODUCTION

The environmental sustainability is one of the main components of development strategy of different economies. Because continues growth of population, urbanization and industries caused the world energy consumption to increase. It has negatively affected the environment and increased global warming. Greenhouse gasses emission cause global warming. It is most serious issue because global warming decreases environmental quality, and has affected emerging, industrialized and developing countries. It is estimated that, if the current greenhouse gas emission level is maintained then the global temperature may rise from 1.1 to 6.4 ^{0}C. According to World Bank (2013) the main factor of greenhouse gases is carbon dioxide, which leads to global warming and climate change. The literature found that CO_2 emissions is one of the reasons of global warming, it reduced the ozone layer (Alam et al., 2012). Currently mutual dependence and connectivity of peoples and countries increased through globalization (hereafter, GLB).

This interdependence can be from economic, political and social perspectives. Every country and human is affected by GLB in some way; it may be in the form of changes in energy consumption and intensity, foreign direct investment, use of technology, employment, GDP growth, financial sector development, industrial expansion or contraction, or environmental alterations. The relationship between GLB and environment is inconclusive. Studies show that, both in short and long-run, GLB affect the environment. Using panel data some studies concluded that, an increase in GLB would decrease CO_2 emissions in the future(Zaidi et al.,2019). Similarly, Rafindadi and Usman (2019) revisited the environmental Kuznets curve (hereafter, EKC) by incorporating the effect of the use of energy and GLB in South Africa. The results of the study suggested that GLB decreased CO_2 emissions in the long-run while it increased CO_2 emissions in the short-run. Recently, many countries are trying to achieve higher economic growth through implementation of some targeted plan which needs higher energy consumption for industrial growth. Considering this phenomena, majority of the studies confirmed that carbon emissions and economic growth (hereafter, EG) are positively linked with each other such as Ardakani and Seyedaliakbar (2019) and Badeeb et al. (2020). Similarly, the relationship between urbanization and carbon emissions is investigated by many researchers such as Lukman et al. (2019) found a

significant short and long-run positive effect of urbanization (hereafter, URB) on carbon emissions. Population is also a key factor that enhance carbon emissions, because population will increase the usage of fossil fuels and natural gas which will positively affect CO_2 emissions (Yeh & Lio, 2017). Similarly, Cramer and Cheney (2000) investigated the impacts of population growth on carbon environmental pollution in California using time series data. The study concluded a positive relationship between population and some sources of emissions.

The greenhouse gas emissions in Afghanistan from agriculture, waste and industrial processes grew by 118% from 1990 -2011, with a 3.3% average annual rate of change (WRI CAIT, 2015). The emissions from agricultural sector grew by nearly 4% per year. This study is significant because, it provides policy recommendations that can help in tackling the emissions, while maintaining long-run economic growth, globalization and urbanization in Afghanistan. Secondly, this study contributes to the environmental economics literature in Afghanistan both empirically and contextually. To the best of our knowledge, this study for the first time investigates the impact of globalization, economic growth, urbanization and population on CO_2 emissions in Afghanistan using some advanced econometrics techniques.

MATERIALS AND METHODS

The current study utilized the time series data of Afghanistan from 1990 to 2020 due to restrictions on the availability of data. Carbon dioxide emission has been taken as a dependent variable, while globalization, economic growth, population and Urbanization are independent variables. The data about these variables are retrieved from World Bank data set. Considering the objective, and based on the econometric model of Ali et al. (2020), we develop the following model.

$$\mathbf{CO_2 = \mathit{f}\ (GLB, GDP, POP, URB)} \quad \ldots\ldots \mathbf{(1)}$$

Where CO_2, GLB, GDP, POP and URB shows carbon emissions, globalization, economic growth, population and urbanization respectively. All dependent variables are converted into natural logarithm to ignore the dynamic properties related to this data. The econometric form of equation (1) is as following:

$$\mathbf{CO_{2t} = \beta_0 + \beta_1 (Log\ GLB_t) + \beta_2 (Log\ GDP_t) + \beta_3 (Log\ POP_t) + \beta_4 (Log\ URB_t) + \mu_t} \ldots\ldots \mathbf{(2)}$$

where t denotes the number of periods, β_0 is the slope intercept, β_1, β_2, β_3 and β_4 are the coefficient estimates globalization, economic growth, population and urbanization respectively. μ_t is the error term. The stationary property of the series is tested through Augmented Dickey fuller and Phillips Perron unit root tests. The short-run coefficients are estimated through ARDL model and long-run coefficients are estimated through ARDL bounds test, the serial correlation among the variables is examined by Breusch and Godfrey LM test.

RESULTS

To use time series data for empirical model, it should be stationary and the unit root tests must be applied. Therefore, we have applied the Augmented Dicky Fuller and Phillips Perron unit root tests.

Table 1. ADF and PP Unit root test results

Variables	ADF- Stat (At level)		ADF-Stat(1^{st} Difference)		PP- Stat (At level)		PP-Stat(1^{st} Difference)	
	I	T & I	I	T & I	I	T & I	I	T & I
CO_2	-0.9039	-2.2513	-3.290**	-3.1402	-1.150	-2.0719	-3.291**	-3.1443
GDP	-0.4749	-2.4364	-4.649***	-4.5946***	-0.609	-2.4499	-4.638***	-4.586***
GLB	-0.4444	-1.6841	-3.752***	-3.6701**	-0.553	-1.7310	-3.77***	-3.684**
POP	-3.056**	-2.3763	-4.701***	-4.7675***	-3.44***	-4.30***	-2.957**	-4.16***
URB	-2.3589	-2.1878	-5.063***	-4.1956***	-2.6037	-3.58**	-3.111**	-4.117**

Note: ***, and ** shows significance level at 1%, and 5% respectively. ADF, null hypothesis is that there is unit root, while alternative says that there is no unit root.

The above table 1 presents the results of ADF and PP unit root tests, considering the variables at level and at 1^{st} difference. All series are stationary at 1^{st} difference with or without linear time trend, considering 1% level of significance. While the POP and URB series are level stationary at 1% and 5% significance level. To find out the long and short-run relationship between the variables we have applied the ARDL model for short-run relationship and ARDL bounds test for long-run relationship. This model is suitable model if some series are stationary at level and some series are stationary at 1^{st} difference.

Table 2. ARDL short-run Parameters estimations			
Dependent variable		CO_2	
Variables	Coefficients	Standard Error	t-statistics
Short-run coefficients			
GDP	0.000202**	0.000136	1.486992
GLB	0.931924***	0.222673	4.185177
POP	30.50588***	9.858854	3.094262
URB	-31.20647***	9.780386	-3.190720
C	9.693876***	3.576366	2.710538
R-Squared		0.967093	
Prob.(F-statistic)		0.000000	
Note: *** indicates significance level at 1% and ** indicates significance level at 10%. Estimations are done using the (ARDL) in EViews. The lag structure is determined by Akaike info criterion (AIC).			

The empirical results from the above ARDL model indicate a significant short-run positive relationship between economic growth, globalization, population and carbon emissions. The R-squared of the model indicates that 96% variation in dependent variable is explained by the independent variables. For testing the serial correlation among the concerned variables, the Breusch – Godfrey serial correlation LM test is utilized.

Table 3. Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.612153	Prob. F(2,33)	0.2302
Obs*R-squared	4.696167	Prob. Chi-Square(2)	0.0956

Based on the above results of LM serial correlation test, it shown that the probability values are greater than 5%. Therefor the null hypothesis of no serial correlation cannot be rejected. And it is deduced that there is no serial correlation among the concerned variables. To confirm and test the long-run relationship of economic growth, globalization, population and urbanization with carbon emissions. The ARDL long-run bounds test is utilized.

Table 4. ARDL Long-run Parameters estimations				
Dependent variable		CO_2		
Variables	Coefficients	Standard Error	t-statistics	
Long-run coefficients				
GDP	0.000212**	0.000147	1.442799	
GLB	0.979897***	0.156912	6.244888	
POP	2.496402***	0.645366	3.868198	
URB	1.882591***	0.526425	3.576182	
C	10.19289***	3.267951	3.119045	
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	6.427329	10%	2.2	3.09
k	4	5%	2.56	3.49
Note: *** indicates significance level at 1% and ** indicates significance level at 10%. Estimations are done using the (ARDL long-run form and bounds test) in EViews.				

The above results given in table.4, indicates that the F-statistics are greater than the upper and lower bounds at 5 % level of significance. Which shows that, there exists a long-run significant positive relationship of economic growth, globalization, population and urbanization with carbon emissions.

DISCUSSION

The short and long-run positive relationship of globalization and economic growth with carbon emissions is consistent with the study conducted by Rafindadi and Usman (2019) in case of south Africa. Based on results one percent increase in economic growth, globalization and population will increase carbon emissions by 0.0002, 0.93 and 30 percent respectively in the short-run and 0.0002, 0.97 and 2.49 percent respectively in the long-run. This positive relationship of economic growth with carbon emissions is logical because due to economic growth all the economic activities such as production, consumption, investment, aggregate supply and

aggregate demand will be motivated in the economy. The higher the level of economic activities the higher will be energy consumption and higher will be the level of environmental pollution. Likely globalization will also enhance economic activities such as trade, foreign investment and production that will increase environmental pollution. Besides, this population is also a significant factor that will enhance environmental pollution. Considering the results, a significant short-run negative and a significant long-run positive relationship between urbanization and carbon emissions exists. This negative relationship between urbanization and carbon emission is also found by Anser and Wasim (2020) considering five SAARC countries. The living standard, literacy rate and life style of urban population are advance as compare to rural population. Therefore, urban population are more environment friendly as compare to rural population. But, as urbanization reach to peak level in the long-run, then peoples living in cities will be more populated and congested, therefore environmental pollution will increase in the long-run due urbanization. This study only focuses on overall index of globalization. Future research on this topic could be more beneficial by considering three sub-indices of globalization (economic, social and political).

CONCLUSION

The study investigated the impact of globalization, economic growth, population and urbanization on carbon emissions in Afghanistan considering the annual time series data for the period of 1990 – 2020. The study utilized different econometric techniques, the results suggests that the model has no serial correlation problem. Interestingly, the outcome of ARDL bounds test show that globalization, economic growth and population have a significant positive short and long-run relationship with carbon emissions. While urbanization has a significant short-run negative and long-run positive relationship with carbon emissions. Results of the study directed toward some important policy implications for Afghanistan. It is found that globalization have a profound effect on the environment in Afghanistan, therefore the governments and policy makers may formulate environment friendly policies related to globalization. Besides this, the policy makers of these countries may motivate the individuals and firms to follow environmental standards and install more solar systems, because solar energy is environment friendly and it is not causing environmental degradation. Further, a careful population stabilization policy can help to reduce carbon emissions in Afghanistan.

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