salmahazem5a@gmail.com. dina.elsayed@guc.edu.eg

roduction

nate change and environment degradation remain a or concern for the achievement of the Sustainable elopment Goals during these precedent times. At her stages of economic growth, countries consume e energy, producing more CO_2, leading to global ming and catastrophic consequences for human fare and natural resources. Rapid deterioration of e resources inevitably lead to economic downturn. s study aims to empirically investigate the tionship between economic activities and ronmental degradation by comparing two countries ifferent development levels.

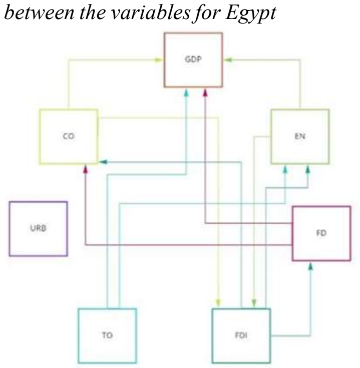
iterature Review

e majority of literature concludes that economic wth proxied by GDP or GDP per capita has a sitive impact on environmental degradation xied by CO_2 emissions where, as income reases environmental degradation increases up to ertain level then it decreases proving the existence EKC hypothesis (see Ozcan et al., 2020; Rahman, 20; Nasir, Huynh, and Tram, 2019; Tamazian and o, 2010; Ang, 2007). On the other hand, others nclude that there is no evidence for the effect of nomic growth on environmental degradation. heampong, 2018).

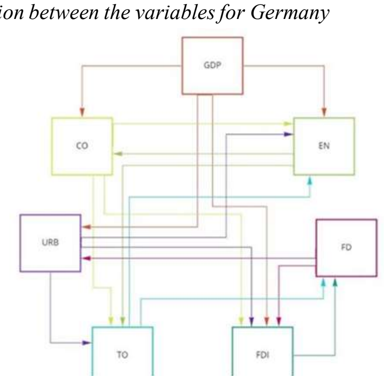
the opposite direction, the majority of literature ds that environmental degradation has a negative ect on economic growth (see Rahman, 2020; an, Peng and Li, 2019; Acheampong, 2018; Saidi l Hammami, 2017; Azam, 2016).

e reason for inconsistency in results can be ibuted to differences in the countries sampled, e series, econometric techniques and thodologies used as well as choice of explanatory iables or level of development achieved (Ozcan et 2020; Shahbaz and Sinha, 2019; Nasir et al., 9; Kahuthu, 2006). Additionally, the EKC oothesis depicts that income and environmental gradation should have an inverse U-shaped tion.

l relation between the variables for Egypt



al relation between the variables for Germany



Methodology

This study utilizes time series data over the period of 1971 to 2019 for 2 countries Egypt and Germany. The dependent variable is CO_2 emissions which is a proxy for environmental degradation while independent variables are real gross domestic product, energy use, financial development, foreign direct investment, trade openness and urbanization all of which represent economic activities all represented as:

$$CO = \beta_0 + \beta_1 GDP + \beta_2 GDP^2 + \beta_3 EN + \beta_4 FD + \beta_5 FDI + \beta_6 TO + \beta_7 URB + \varepsilon$$

Multiple econometric tests were employed, firstly by testing for stationarity among the variables using ADF unit root test. After that, cointegration was tested using the Johansen Cointegration test to establish a long run relationship. Following that the study employs Granger causality test for all variables. Autoregressive Distributed Lag model (ARDL) was used to investigate the long run relation between the dependent variable CO^2 and the independent variables. ARDL was chosen based on its ability to better suit variables that interact over a large period of time unlike the OLS regression model. As for testing the robustness of the model normality of residuals, serial correlation, and heteroscedasticity tests were used. Finally, CUSUM and CUSUMSQ tests based on recursive residuals were used to plot and detect breakpoints of the model.

Results

Equation for Egypt

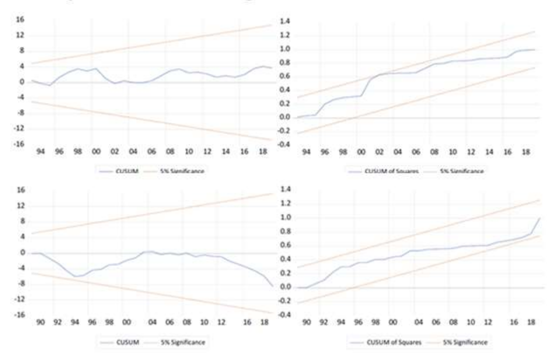
$CO = 60.51497 - 6.113251GDP + 0.404504GDP^2 + 0.349724EN + 0.240745FD - 10.79654URB + \varepsilon$

Equation for Germany

$CO = -53.96392 + 12.45357GDP - 0.630200GDP^2 - 0.461778EN - 0.010689FDI + \varepsilon$

The results of the ARDL model varied across both countries of interest. For Egypt, the slope coefficient for GDP and GDP squared showed conflicting results with the EKC hypothesis. For GDP, the coefficient is -6.113251 meaning that as GDP increases by 1%, CO_2 emissions decrease by -6.113251% and for GDP squared the coefficient is 0.404504%. This suggests that at initial levels of GDP, emissions decrease while at further increase in GDP represented by GDP squared, the emissions increase. This concludes the absence of the EKC hypothesis in Egypt.

On the other hand, ARDL results for Germany were consistent with EKC hypothesis where the coefficient of GDP is 12.45357% while for GDP squared it was -0.630200%. This suggests that the initial levels of GDP, CO_2 emissions were increasing and the environment was degrading, however, at further increases in GDP, CO_2 emissions decreased. This clearly indicates an inverted U-shaped curve representing the relationship between environmental degradation and economic activities in Germany.



Conclusion

The relationship between environmental degrada and economic growth was analyzed by reviewing Environmental Kuznets Curve (EKC). relationship is modelled by an inverted U sh curve where initially as income incre environmental degradation also increases. This oc until income reaches a certain threshold then it sh a turning point where environmental degrada decreases with further increases in income.

Results of the ARDL show that for Egypt, GDP capita has a negative relation to CO_2 per capita v GDP squared has a positive relation. It showed energy use and financial development have a pos relation to CO_2 while urbanization has a neg relation. Thus, evidence for the EKC hypothesis not found in Egypt. On the other hand, for Germ GDP had a positive relation with CO_2 emiss while GDP squared had a negative relation confir EKC hypothesis.

With regard to the theoretical basis of the mode might be incorrect to assume that once a count developed, it will automatically start to lower its emissions as environmental degradation. A changes need to be taken in order to reach this including structural changes which inc environmental policies and regulations as wel raising awareness among consumers in order to them to demand more environmentally frie products. Consequently, we can determine that outcome relies on structural change.

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