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Do Economic Growth, Financial Development, and Renewable Energy Consumption affect Environment Pollution? Empirical Evidence from South Asian Countries

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Abstract: *The main motive of this paper is to know the impact of economic growth, financial development and renewable energy consumption on environment pollution in South Asian countries (SAC) and also tries to show the impact of exports and population growth on environment pollution during the period from 1990 to 2014 by applying panel ARDL Model. In our study it is found that one unit increase in financial development (FD) tends to increase 0.3356 units of CO_2 emissions (CE) in selected South Asian countries. Renewable energy consumption (RE) significantly decreases the environmental pollution, where one unit increase in the RE will decrease 0.5878 units of CO_2 emission. The "error correction term (ECT)" stands the adjustment is 37% to reach a long-term balance in South Asian countries (SAC). Since there is a significant positive liaison of financial development and environment pollution, the key contribution of this study requires that policy makers should consider green financing or sustainable financial development to mitigate environment pollution.*

Keywords: *Financial Development, Environment Pollution, Economic Growth, Renewable Energy, Population growth, ARDL Model.*

1. Introduction

Environmental pollution is a burning issue nowadays. CO_2 emission is the major culprit for the greenhouse effect and is considered as the most concerning environmental difficulties in the present world. The survival of human being becomes in danger of extinction due to this greenhouse affects (Jian *et al*, 2019). The availability of energy is growing daily in order to support the world economy, but as energy use grows, so does greenhouse gas emissions, which pose a serious threat to the environment. Globally energy consumption raises by

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2.3% in 2018 due to increasing trend of economic growth and it is predicted that by 2030 60% demand will increase for energy compared with 2000 and associated with CO_2 emissions (World Energy Outlook, 2019). For guaranteeing supportable turn of events and development, we should worry with natural quality that implies ecological contamination. Table 1 shows GDP and population growth in the SAC from 2014 to 2018.

Table 1: GDP and Population growth in South Asian countries from 2014 to 2018

Year	Bangladesh		India		Sri Lanka		Pakistan	
	GDP growth (GDPG)	Population growth (POPG)	GDPG	POPG	GDPG	POPG	POPG	POPG
2014	6.0610	1.1425	7.4102	0.6274	4.9607	0.9332	4.6747	2.0922
2015	6.5526	1.1172	7.9962	1.1166	5.0076	1.1281	4.7311	2.0876
2016	7.1135	1.0913	8.2563	1.0898	4.4866	1.4057	5.5267	2.0843
2017	7.2841	1.0702	7.0438	1.0625	3.4198	1.5281	5.5542	2.0749
2018	7.8637	1.0500	6.1195	1.0373	3.2091	1.5475	5.8364	2.0558

Source: WDI (2020)

The following Figure 1 shows the CO_2 emissions in South Asian countries from 2005 to 2016 based on the data of World Bank (2020); Where CO_2 emission is moderately higher in India, then in Pakistan and third in Bangladesh. Maldives has comparatively lower emission of CO_2.

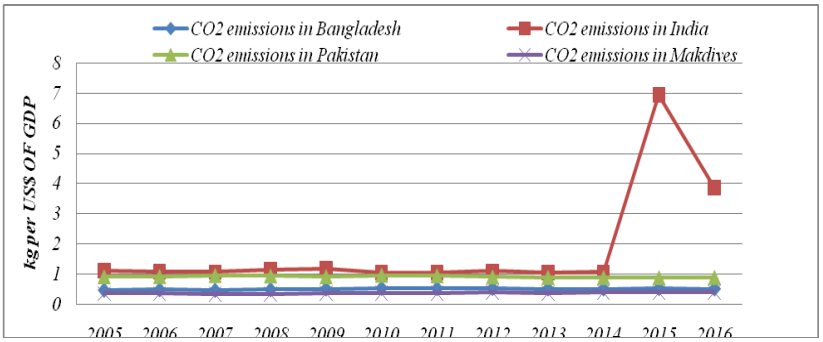

Figure 1: CO2 emissions in South Asian countries from 2005 to 2016

The goal of the paper is to know the effect of financial development, sustainable power use, and monetary advancement on climate contamination in South Asia and furthermore attempts to show the effect of populace development and commodities on ecological contamination. Moreover, the world is changing very fast with economic growth and development but we have to keep in mind about the environment and should ensure all-natural circulation of the environment that is why we have to mitigate CO_2 emission around the world. As the increment of CO_2 emanations is the main consideration in the environmental change danger, it is perquisite to take a gander at the effect of monetary development, sustainable

power utilization, and monetary turn of events, products and populace development on natural discharge to take legitimate estimation.

There are six sections of the study. The first section is devoted to a general summary of the introduction. Objectives of the study are discussed in section two. A literature analysis is discussed in section three. In the fourth section, the methodology is addressed. The fifth section includes the result analysis and discussion. At last, Chapter six displays conclusions and recommendations.

2. Objectives of the Study

The main objectives of the study are to determine how environmental pollution in SA countries is impacted by economic expansion, financial development, and the use of renewable energy sources. More specific objectives are:

i. To ascertain how financial development affects environmental pollution

ii. To demonstrate the short- and long-term effects of the chosen variables on CO2 emission in South Asian nations

3. Literature Review

This paper considers some control variable such as exports and population growth to show the impact of these economic variables on environmental pollution. There are enormous theoretical and empirical investigations on the topic. Some of those are included here.

Table 2: Literature Review

Author(s)	Country and Data	Methodology	Findings
Tiwari, (2011)	India; 1971- 2007	VECM and VAR model	GDP growth extended by energy use and energy cause to carbon emission.
Azam et al., (2015)	Selected developed and developing countries; 1971-2013	FMOLS; Panel cointegration	Economic growth has no significant impact on emission.
Arouri et al., (2012)	Developing countries; 1981-2005	Panel long run estimation and Co-integration approach	Expansion of economic size raises CO_2 emissions.
Rahman and Majumder (2022)	N-11; 1972-2019	GMM, FMOLS	Emission increased by economic growth where renewable energy reduces emission.
Voumik et al. (2022)	Bangladesh; 1971-2020	ARDL	Pollution raised by economic development and renewable source of energy decline pollution.
Majumder and Rahman (2022)	Bangladesh; Field Survey 2022	SEM	Economic actions increase pollution, and pollution raised health vulnerability.

Author(s)	Country and Data	Methodology	Findings
Rahman et al. (2021)	Bangladesh; 1975-2018	Causality Analysis	Economic development and industrialization cause pollution.
Effiong (2016)	African countries; 1990 to 2010	Panel Regression	CO_2 raised by economic development where energy also boosts emission.
Majumder et al. (2022)	South Asia; 2000-2019	GMM, Quantile Regression	Development activities raise emission and the emission creates health impact and environmental impact.
Voumik et al. (2023	SAARC; 1982-2021	CS-ARDL	Nonrenewable has impact on emission and development of economy also has impact to raise emission.
Rahman and Majumder (2020)	Industrialized Countries; 1980-2014	FMOLS and Causality Approach	CO_2 raised by energy and industrialization as well as economic growth.
Anser et al. (2020)	SAARC; 1994-2013.	STIRPAT model	Economic development or financial progress cause to environmental degradation.

Source: Authors' Self Investigations.

However, there are a lot of papers on the environment pollution and the factors which causes environmental pollution. Many researchers use these variables like economic growth, energy consumption, consumption of renewable energy, financial development, population growth, exports to show the impact on environment pollution but in this paper, we are going to show the impact of all these variables for comparative analysis on environmental pollution in South Asian countries.

4. Methodology

For the five South Asian nations of *"Bangladesh, India, Pakistan, Sri Lanka, and Nepal",* annual data from the World Development Indicators are gathered from 1990 to 2014. The statistical program E-Views 12 is used to analyze the data. The ARDL model is thought to be the "best econometric strategy when the variables are stationary at I (0) or integrated of order I (1)." Compared to other models, it is more effective at capturing both the immediate and long-term impacts of independent factors on the developed dependent factor. We use the ARDL model to determine the short- and long-term dynamics because some of our variables are integrated at I (0) and some others at I (1) order of integration.

Model Specification

$$CO_2\ emission = f(economic\ growt, renewable\ energy\ consumption, financial\ development, export, population\ growt) \quad (1)$$

Considering the log form of the selected factors, the model is,

$$lnCO_{2,it} = \alpha + \beta_1 lnGDPG_{it} + \beta_2 lnRenew_{it} + \beta_3 lnFD_{it} + \beta_5 lnEx_{it} + \beta_4 lnPG_{it} + \mu_{it} \quad (2)$$ t= 1, 2, 3.....T; i=1, 2, 3, ...N

Where, i signify countries and t designate time. Here, the variables details are "CO_2 = CO_2 emissions (kg per 2010 US$ of GDP) used as the proxy of environmental pollution; GDPG = GDP growth (annual %), Renew= Renewable energy consumption (% of total final energy consumption), FD= Financial development (Domestic credit to private sector (% of GDP)), Ex= Exports of goods and services (current US$), PG= Population growth (annual %)." Those variables are showing the consistency of this research.

Panel ARDL

Pesaran and Shin (1999) introduced the ARDL model, which was then extended by Pesaran, Shin, and Smith (2001) to manage the long-and short-run connections among the factors. The ECT can be produced from the ARDL procedure, as indicated by Banerjee et al. (1993). What is more, whether the information is coordinated at level, first distinction, or mixed, the ARDL approach can be used to track down the presence of a long run relationship among the factors.

Hypotheses of the Study

Economic growth has both constructive and unconstructive impacts on carbon emissions. Carbon extended by the increase of economic total size is found by Mesagan,(2015); Arouri *et al.,(*2012); Cheng *et al.* (2019) and negative impact is found by Jian *et al.*(2019); Aye and Edoja, (2017); Atici,(2008).

H_1: *Economic development affects CO_2 emission in SA countries*

H_2: *Renewable energy extend the CO_2 emission in SA countries*

Renewable energy reduces CO_2 emissions is discovered by Spetan, (2016); Li and Su, (2017).

H_3: *Financial development expand CO_2 emission in SA countries*

Financial development positively influence environmental pollution is found by Jian *et al*. (2019); Zhang, (2011); Cheng *et al*. (2019) where negative impact is showed by Shahbaz *et al.* (2013); Ghorash and Rad (2018).

H_4: *Export has impact on CO_2 emission in SA countries.*

Exports increases carbon emissions are found by Cheng et al. (2019); Anser et al. (2020). Exports decrease in carbon emissions is found by Bosupeng, (2016).

H_5: *Population growth introduces CO_2 emission in SA countries.*

Population growth has a upbeat effect on CO_2 emission is found by Aye and Edoja, (2017); Zarzoso, (2006).

5. Data Analysis and Result Discussion

Statistical and econometric methods have provided various results where the results are presented below.

Descriptive Statistics of the Variables

Table 3 shows the numerical scenery of the data of South Asian states throughout the values of the *"mean, median, maximum, minimum, and standard deviation, Skewness, Kurtosis."* The probability value of *lnRenew, lnFD and lnEx* show the normal distribution of the data and the rest of the variables will be normally distributed with the first difference.

Table 3: Results of Descriptive Statistics of South Asian Countries

	$LnCO_2$	**LnGDPG**	**LnRenew**	**LnFD**	**LnEx**	**LnPG**
Mean	-0.30285	0.679006	1.771427	1.424192	9.99962	0.174643
Median	-0.33629	0.703172	1.759672	1.417099	9.985368	0.239232
Maximum	0.147904	1.011146	1.978271	1.772164	11.67411	0.47064
Minimum	-1.02355	-0.9203	1.564096	0.945528	8.581932	-0.98117
Std. Dev.	0.298722	0.227468	0.112897	0.167213	0.70068	0.24504
Skewness	-0.03233	-3.36453	0.327762	-0.33923	0.403582	-1.78235
Kurtosis	1.681391	22.48126	2.219469	3.395125	2.979292	8.166395
Jarque-Bera	8.78717	2141.698	5.237992	3.107816	3.286883	198.6349
Probability	0.012356	0.000	0.072876	0.21142	0.193314	0.000

Source: Eviews Result

Panel Unit Root Test

For the panel root unit tests, this study has used "Levin, Lin & Chu t* and Im, Pesaran, and Sin W-stat" tests. The results of the unit root investigations are represented in Table 4 for South Asian Countries. It has found that *LnGDPG, LnRenew and LnPG* are stationary at I (0) and *LnCO2, LnFD and LnEx* are at "stationary at I (1) and this mixed order integration suggests the use of Panel ARDL approach" for south Asian countries.

Table 4: Panel Unit Root Result

	Levin, Lin &Chu t*				**Im, Pearson and Shin W-stat**				
	Level		**First Difference**		**Level**		**First Difference**		
Variables	**T-stat (TS)**	**P value (P)**	**TS**	**P**	**T S**	**P**	**TS**	**P**	**Result**
$LnCO_2$	-1.60023	0.0548	-4.111	0.000	-0.5854	0.2791	-6.4376	0.000	I(1)
LnGDPG	-5.2665	0.000	-5.9335	0.0000	-4.5309	0.0000	-7.8525	0.000	I(0)
LnRenew	-4.8435	0.000	-1.555	0.060	43.8778	0.000	-3.0993	0.0010	I(0)
LnFD	0.1134	0.5452	-1.2547	0.1048	1.1344	0.8717	-3.6069	0.000	I(1)
LnEx	-0.5385	0.2986	-4.4300	0.000	1.7437	0.9594	-4.2710	0.000	I(1)
LnPG	-0.2152	0.4148	-5.8472	0.000	0.8121	0.7916	-5.3927	0.000	I(0)

Source: Eviews result

The Optimum Lag Selection Criterion

The outcome of the optimum lag variety criterion is demonstrated in Table 5 for South Asian Countries where the optimal lag is selected by AIC criterion. The optimum lag for this model is 1.

Table 5: Optimum Lag-length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	181.6784	NA	8.48e-10	-3.861064	-3.695513	-3.794274
1	862.2498	1256.440	5.98e-16*	-18.02747*	-16.86861*	-17.55994*
2	886.9037	42.26385	7.75e-16	-17.77810	-15.62594	-16.90984
3	913.3335	41.82291	9.81e-16	-17.56777	-14.42230	-16.29877
4	935.6664	32.39497	1.39e-15	-17.26739	-13.12861	-15.59765
5	999.3181	83.93638*	8.24e-16	-17.87512	-12.74304	-15.80465

Source: Eviews result

Estimates of Panel ARDL Model

Table 6 displays the panel ARDL model's findings along with the corresponding coefficients, t stats, and probabilities of the variables for SAC. Here GDP growth negatively but insignificantly co-integrated with CO_2 in the long run, where a one unit increase in LnGDPG will decrease 0.0786 units of CO_2 emissions in SAC. The FD decidedly and fundamentally influences CO_2 emanations in SA nations. The outcomes show that one unit expansion in LnFD will in general increment 0.3356 units of CO_2 emanations. The RE utilization altogether diminishes the natural contamination; the outcomes showed that one unit expansion in LnRenew will diminish 0.5878 units of CO_2 outflows in South Asian nations. Exports also negatively associated with environmental pollution; from the table we find that one unit increase in LnEx will decrease CO_2 emissions by 0.0955 units. Results also showed that Population growth significantly and positively impacts environmental pollution; where one unit increase in LnPG tends to increase 0.2218 units of CO_2 in SA countries. The ECT (Error Correction Term) esteem shows the speed of change of imbalance adjustment on an economy. In Table 11 it is detectable that ECT remains at - 0.3741 with measurably critical outcomes which suggest that the speed of rectification is 37% to arrive at a drawn-out balance. In the short run LnGDPG, LnEx, LnPG emphatically connected with CO_2 outflows however LnFD, LnRenew adversely connected with ecological contamination in South Asian nations.

Table 6: Short and Long Run Estimations through Panel ARDL

Variables		Coefficients	T stat	Prob.
Long run	LnGDPG	-0.0786	-1.5280	0.1304
	LnFD	0.3356	4.4028	0.0000
	LnRenew	-0.5878	-3.1098	0.0026
	LnEx	-0.0955	-2.4047	0.0185
	LnPG	0.2218	3.9747	0.0002
Short-run	ECT	-0.3741	-2.7608	0.0071
	Δ LnGDPG	0.0001	0.0289	0.9770
	Δ LnFD	-0.1425	-1.7500	0.0839
	Δ LnRenew	-2.2825	-1.4242	0.1582
	Δ LnEx	0.0270	0.3864	0.7002
	Δ LnPG	0.4163	0.7683	0.4445
	Constant	0.4117	2.9270	0.0044

Source: Eviews Result

Country-wise Impact

Bangladesh

The value of ECT in Bangladesh is negative (See Appendix table 1), suggesting that the speed of acclimation to the adjustment disequilibrium or imbalance to accomplishing long haul balance is 85%. In the short run, GDP growth and exports have a positive relationship with CO_2 emissions (CE) in Bangladesh, whereas financial development, RE, and population increase have a negative relationship with CE in Bangladesh.

India

From the Appendix Table 1 in India, the coefficient of ECT involves that the velocity of acclimation to the revision imbalance to arriving equilibrium is 13%. Population growth positively associated with CE in India but GDP growth, FD, RE and exports have negative collision on CE in India in the short run.

Pakistan

From the Appendix Table 1 in Pakistan, the ECT is negative and considerable suggests that the speed of change in accordance with the adjustment disequilibrium to arriving at long haul balance is 8%. The FD and population growth positively associated with CE in Pakistan but GDP growth, RE and exports have negative impact on CE in Pakistan in the short run.

Sri Lanka

From the Appendix Table 1 in Sri Lanka, ECT is negative and considerable, that the velocity of acclimation to the amendment imbalance to arriving at long term equilibrium is 40%. Exports positively associated with CE in Sri Lanka but GDP growth, RE, FD and population growth and have negative impact on CE in Sri Lanka in the short run.

Nepal

From the Appendix Table 1 in Nepal shows that the ECT is negative and significant, which means that it has take 40% longer to reach long-term equilibrium after the correction disequilibrium. GDP growth and exports positively associated with CO_2 in Nepal but FD, RE and population have negative association on CE in Nepal in the short run.

Diagnostic Tests

Some essential diagnostic tests are also conducted by the study that is required for the use of ARDL model. Serial correlation, heteroskedasticity, and normal distribution diagnostics are all carried out with these tests. Appendix Table 2 summarizes the findings of the related diagnostic tests and shows that the anticipated model is free of serial correlation and heteroskedasticity problems and that the error term is normally distributed.

Findings and Hypothesis Analysis

In south Asian countries, GDP growth negatively but insignificantly (Prob. 0.1304) accelerate environment pollution. Negative impact is also found by Jian *et al.* (2019); Aye and Edoja, (2017); Atici (2008). In South Asian countries, FD negatively and significantly (prob. 0.00) influences environmental pollution. Shahbaz *et al.* (2013); Ghorash and Rad; (2018) also found negative impact of FD on environmental pollution. Renewable energy consumption is negatively and significantly (prob. 0.00) affecting environmental pollution in South Asian countries. Negative impact of RE is also found by Hanif (2018); Li and Su, (2017). In this case H_3 is accepted. Export negatively and significantly (prob. 0.01) affects environment pollution in SA countries. Bosupeng, (2016) also found negative impact of exports on environment pollution. Population growth positively and significantly affects environment pollution in South Asian countries. This finding is similar to the findings of Aye and Edoja, (2017); Martínez-Zarzoso *et al*. (2019). So, we fail to reject H_5.

6. Conclusion and Recommendations

Energy supply is growing daily in regulate to support the world economy. Energy makes use of and pollution is also rising in tandem with these rising levels of use, endangering the world. The prime goal of the paper is to understand how South Asian countries' environmental pollution is impacted by economic growth, RE, and financial development. Additionally, we look for the impact of exports and population growth on environmental pollution as well as the long- and short-term effects of the chosen factors on CO_2 emissions in South Asian nations.

Based on the findings of the paper, special attention should put on financial development and population growth in South Asian countries as they are positively associated with environment pollution. These two variables should check crucially to manage CO_2 emission. On the other hand, sustainable power or energy utilization ought to increment as it decreases the contamination in South Asian nations. In this specific situation, the utilization of environmentally

friendly power or energy can assume a fundamental part to check CO_2 emanation. To achieve this, satisfactory arrangement upholds in mechanical advancement is required and need to underscore on the utilization of biogas energy, sunlight-based energy, and biomass energy. Research and development (R&D) should expand for sustainable energy and boost the amount of renewable energy in the overall energy configuration as much as practicable. This area is also negatively associated with exports. As a result, exports should expand in this sector, although environmental degradation should be considered.

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Appendix

Table 1: Short run impact of GDP growth, Financial Development, Renewable energy Consumption, Exports and Population growth on environmental pollution in South Asian Countries

Bangladesh

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
ECT	-0.847899	0.011043	-76.78429	0.0000
D(LnGDPG)	0.012964	0.000712	18.20887	0.0004
D(LnFD)	-0.260603	0.006882	-37.86738	0.0000
D(LnRenew)	-1.727304	0.053750	-32.13614	0.0001
D(LnEx)	3.87E-05	0.002317	0.016702	0.9877
D(LnPG)	-0.274630	0.020502	-13.39534	0.0009
C	0.952096	0.365801	2.602771	0.0802

India

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
ECT	-0.132663	0.006129	-21.64671	0.0002
D(LnGDPG)	-0.013039	8.73E-05	-149.3390	0.0000
D(LnFD)	-0.001751	0.013071	-0.133987	0.9019
D(LnRenew)	-0.442399	0.123665	-3.577407	0.0374
D(LnEx)	-0.162528	0.003633	-44.73171	0.0000
D(LnPG)	2.573494	1.563532	1.645949	0.1983
C	0.242537	0.034063	7.120340	0.0057

Pakistan

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
ECT	-0.085967	0.004268	-20.14121	0.0003
D(LnGDPG)	-0.005026	0.000123	-41.01834	0.0000
D(LnFD)	0.011500	0.006019	1.910635	0.1520
D(LnRenw)	-0.293805	0.108108	-2.717698	0.0727
D(LnEx)	-0.056944	0.004680	-12.16867	0.0012
D(LnPG)	0.038511	0.124369	0.309652	0.7771
C	0.123826	0.012165	10.17911	0.0020

Sri Lanka

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
ECT	-0.401007	0.018352	-21.85039	0.0002
D(LnGDPG)	-0.012612	0.002310	-5.460759	0.0121
D(LnFD)	-0.058321	0.002619	-22.26833	0.0002
D(LnRenew)	-0.344895	0.294075	-1.172810	0.3255
D(LnEx)	0.109253	0.068213	1.601652	0.2076
D(LnPG)	-0.075290	0.001254	-60.03676	0.0000
C	0.406144	0.108902	3.729456	0.0336

Nepal

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
ECT	-0.403407	0.004403	-91.63088	0.0000
D(LnGDPG)	0.018667	0.000236	79.25084	0.0000
D(LnFD)	-0.403429	0.020772	-19.42188	0.0003
D(LnRenew)	-8.604282	1.933973	-4.449018	0.0211
D(LnEx)	0.245588	0.013706	17.91859	0.0004
D(LnPG)	-0.180504	0.005075	-35.56722	0.0000
C	0.360639	0.076690	4.702586	0.0182

Table 2. Diagnostic Tests Results

Country/Cross Section Unit	**Heteroskedasticity Test: Breusch-Pagan-Godfrey**			
India	F-statistic	0.52	Prob. F (8,14)	0.82
	Obs*R-squared	5.28	Prob. Chi-Square (8)	0.73
	Breusch-Godfrey Serial Correlation LM Test:			
	F-statistic	1.20	Prob. F (2,12)	0.34
	Obs*R-squared	3.82	Prob. Chi-Square (2)	0.15
	Jb Normality Test	0.80	Probability Jb Normality Test	0.67
Bangladesh	Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	F-statistic	1.21	Prob. F (8,15)	0.36
	Obs*R-squared	9.41	Prob. Chi-Square (8)	0.31
	Jb Normality Test	0.77	Probability Jb Normality Test	0.66
Pakistan	Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	F-statistic	1.98	Prob. F (11,11)	0.14
	Obs*R-squared	15.29	Prob. Chi-Square (11)	0.17
	Breusch-Godfrey Serial Correlation LM Test:			
	F-statistic	0.92	Prob. F (2,9)	0.43
	Obs*R-squared	3.90	Prob. Chi-Square (2)	0.14

Country/Cross Section Unit	Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	Jb Normality Test	0.34	Probability Jb Normality Test	0.84
Sri-Lanka	Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	F-statistic	0.45	Prob. F (10,9)	0.89
	Heteroskedasticity Test: Breusch-Pagan-Godfrey			
	F-statistic	0.74	Prob. F (9,13)	0.67
	Obs*R-squared	7.79	Prob. Chi-Square (9)	0.56
	Breusch-Godfrey Serial Correlation LM Test:			
	F-statistic	2.49	Prob. F (1,12)	0.14
	Obs*R-squared	3.95	Prob. Chi-Square (1)	0.07
	Jb Normality Test	0.83	Probability Jb Normality Test	0.66
Nepal	Obs*R-squared	6.64	Prob. Chi-Square (10)	0.76
	Breusch-Godfrey Serial Correlation LM Test:			
	F-statistic	1.20	Prob. F (1,8)	0.31
	Obs*R-squared	2.61	Prob. Chi-Square (1)	0.11
	Jb Normality Test	3.47	Probability Jb Normality Test	0.06