Governance and Sustainable Development in South Asian Countries: A Panel Data Analysis

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1.Introduction

- Sustainable Development is goal of the day because future generations and neighboring vicinities could not be deprived of the niceties just because that generation of the day needs development.
- Development could be termed as necessary but not a sufficient condition for sustainable development.
- Inadequate development path could lead towards deprivations, social sector deficiencies, and global warming.

1.Introduction

- The sustainable development is most important issue for developing countries because of their thrust for development.
- As Market Friendly approach explains that private sector while pursuing personal interests is unwilling to adopt sustainable techniques in provisions of social sector services, management problems and production processes which points out the role of government for this purpose.
- Even governments join hands under SDGs but whether such an attempt will be successful .

1.Introduction

- This depends on the way of government while considering all the stakeholders which is known as governance.
- It is the governance which creates differences for achieving goals by the government e.g. goals of sustainable development.
- Hence this study hypothesizes a positive role of governance for sustainable development.

2. Literature Survey

- **Measurement of Sustainable Development**:
- Major segment of the evidence on sustainable development is devoted towards its measurement. Earlier single variables were used but later on keeping in view multidimensional aspects of sustainable development, indexes were also constructed but still the issue is not resolved universally.
- Single variable is unable to capture the concept while indexation mentions too many variables which may not serve the purpose.
- **Dimensions of Sustainable Development:**
- Initially the concept was related with environmental issue but with the passage of time it found out that it is a multidimensional concept.
- Normally three major areas are considered most important for capturing sustainable development i.e. economic, social and environment.

2. Literature Survey

- **Governance and Sustainable Development**:
- Strong role of governance for sustainable development is recognized.
- Governance works for all the three dimensions of sustainable development affirmatively i.e.
  - Enhance economic progress
  - Improve social sector development
  - Control environmental degradation
- The Environmental degradation model is normally described under Environmental Kuznet Curve Hypothesis.

3.Data and Methodology

- As observed in literature survey that there are major differences in measurement of sustainable development, hence, this study follows theory and analyze three cores aspects of sustainable development:

Growth Model:

$$LNG_{it} = \alpha + \beta_1 GOV_{it} + \beta_2 GFCF_{it} + \beta_3 INF_{it} + \varepsilon_{it} \qquad (1)$$

Human Development Model:

$$HDI_{it} = \alpha + GOV_{it} + GDPG_{it} + INF_{it} + FDI_{it} + GFCF_{it} + OPEN_{it} + \nu_{it} \qquad (2)$$

Environmental Degradation Model:

$$GGE_{it} = \alpha + GOV_{it} + POPD_{it} + GDPG_{it} + GDPGS_{it} + OPEN_{it} + FDI_{it} + INDV_{it} + AGV_{it} + \varepsilon_{it} \qquad (3)$$

3.Data and Methodology

- **Variables of the Models:**

α	=	Constant
LNG	=	Natural logarithm of gross domestic product (GDP) in constant 2010 US $
GOV	=	An index computed as simple average of six different indicators of governance in percentile rank as described by WGI
GFCF	=	Gross fixed capital formation as percentage of GDP
INF	=	Percentage annual GDP deflator
HDI	=	Human Development Index classified as low if less than 0.550, medium if greater or equal to 0.550 and less than 0.700, high if greater than or equal to 0.700 and less than 0.800, and very high if greater than or equal to 0.800
GDPG	=	Percentage annual GDP growth
FDI	=	Foreign direct investment as percentage of GDP
OPEN	=	Openness defined as external balance on goods and services as percentage of GDP
GGE	=	Greenhouse gas emission (kt of Co_2 equivalent)
POPD	=	Population density defined as people per square kilometer of land area
GDPGS	=	Square of percentage annual GDP growth
INDV	=	Industrial value added as percentage of GDP
AGV	=	Agricultural value added as percentage of GDP
ε	=	Error term of regression model
ν	=	error term in case random effect model = ε_1 (within entity error) + μ (between entity errro)
within	=	Between time series elements after demened them by the average value
between	=	Between cross sections elements after averging them in time element

- Six different indicators of governance as described by WGI are control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law and voice & accountability. The WGI mentions two different measures of governance for each of these indicators as 'estimate' and percentile rank. This study utilizes percentile rank for analysis purpose.

3.Data and Methodology

- Data Sources: WDIs, WGIs, HDRs
- Panel Data techniques are used as per model requirement while considering N and T in the perspective of long and short panels.
- Pre-requisite for cointegration analysis in panel data model is large N and T.
- In case of short panels model selection out of pooled, random and fixed estimates, is based on behalf of LM and Hausman tests.
- In growth model cointegration analysis is used while random effect estimates and pooled estimates are focused in human development model and environmental degradation model respectively.

4.Results and Discussion

Table: 4.1 DESCRIPTIVE STATISTICS FOR GROWTH MODEL

Variable	Mean	Standard Deviation			Min	Max
		Overall	Between	Within		
Growth(Log)	6.02	3.10	1.48	2.78	1.06	21.02
Governance	28.19	13.76	14.73	2.48	2.94	48.79
Capital Formation	26.81	8.11	7.92	3.59	14.12	42.48
Inflation	8.00	4.76	1.69	4.50	-2.11	22.8

Calculated by Authors

Note: N=78, n=6(Afghanistan, Bangladesh, India, Nepal, Pakistan, Sri Lanka), T=13 (2003-2015)

Table: 4.2 PANEL UNIT ROOT FOR GROWTH MODEL

Variable		L.L.C		Breitung		I.P.S		Fisher (ADF)		Fisher (PP)		I.O
		Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	
Growth (Log)	Level	-0.52	0.30	-0.27	0.39	2.41	0.99	6.03	0.91	4.97	0.95	I(1)
	1st D.	-4.78	0.00	-2.40	0.00	-1.06	0.14	16.77	0.15	4096	0.00	
Governance	Level	-0.39	0.34	2.34	0.99	1.63	0.94	6.195	0.90	8.46	0.74	I(1)
	1st D.	-6.06	0.00	1.66	0.95	-3.50	0.00	37.85	0.00	46.65	0.00	
Capital Formation	Level	-2.16	0.01	-0.34	0.36	-0.60	0.27	13.55	0.33	12.18	0.43	I(1)
	1st D.	-6.27	0.00	-3.29	0.00	-2.64	0.01	26.83	0.01	30.45	0.00	
Inflation	Level	-1.83	0.03	-	-	-1.03	0.14	17.33	0.13	23.82	0.02	I(1)
	1st D.	-9.54	0.00	-	-	-6.30	0.00	55.32	0.00	78.50	0.00	

Calculated by Authors

L.L.C = Leven, Lin and Chu, I.P.S=Im Pesaran and Shin

4.Results and Discussion

Table: 4.3 PEDRONI RESIDUAL COINTEGRATION TEST FOR GROWTH MODEL

Criterion	Statistic	Probability	Decision
Panel v-Statistic	29.98	0.00	Cointegrated*
Panel rho-Statistic	1.69	0.95	Not Cointegrated
Panel PP-Statistic	-1.51	0.06	Cointegrated***
Panel ADF-Statistic	-3.45	0.00	Cointegrated*
Panel v-Statistic (weighted)	22.46	0.00	Cointegrated*
Panel rho-Statistic (weighted)	1.97	0.97	Not Cointegrated
Panel PP-Statistic (weighted)	-0.24	0.40	Not Cointegrated
Panel ADF-Statistic (weighted)	-2.66	0.00	Cointegrated*
Group rho-Statistic	2.72	0.99	Not Cointegrated
Group PP-Statistic	-2.48	0.00	Cointegrated*
Group ADF-Statistic	-3.25	0.00	Cointegrated*
Overall Decision		**Cointegrated**	

Calculated by Authors
Note: *= at 1% level, **=at 5% level, ***=at 10% level

Table: 4.4 Panel Fully Modified Least Squares (FMOLS) Estimates of Growth Model

Variable	Coefficient	Std. Error	t-Statistics	Probability
Governance	-0.0183	0.014	-1.293	0.200
Capital Formation	0.0399	0.012	3.182	0.002
Inflation	-0.0221	0.009	-2.360	0.021

Calculated by Authors

4.Results and Discussion

Table: 4.5 DESCRIPTIVE STATISTICS FOR HUMAN DEVELOPMENT MODEL

Variable	Mean	Standard Deviation			Min	Max
		Overall	Between	Within		
Human Development	0.60	0.09	0.09	0.01	0.45	0.77
Governance	33.33	15.58	16.25	2.59	3.33	63.66
GDP Growth	5.66	2.68	1.24	2.42	1.11	14.43
Inflation	7.27	4.15	1.26	3.98	0.24	22.8
Foreign Direct Investment	2.35	3.67	3.67	1.20	.15	17.29
Openness	-13.03	15.64	16.30	2.66	-43.45	18.76

Calculated by Authors
Note: N=48, n=8 (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka), T=6(2010-2015)

Table: 4.6 PANEL ESTIMATES FOR HUMAN DEVELOPMENT MODEL

Variable	Pooled		Fixed Effect		Random Effect	
Governance	0.0028*	(4.54)	0.0012***	(1.75)	0.0020**	(2.47)
GDP Growth	-0.0009	(-0.29)	-0.0014***	(-1.93)	-0.0016**	(-1.98)
Inflation	-0.0003	(0.15)	-0.0008***	(-1.78)	-0.0006	(-0.89)
Foreign Direct Investment	0.0011	(0.38)	0.0008	(0.55)	0.0020**	(1.93)
Openness	0.0020	(2.67)	0.0003	(0.62)	0.0010*	
Constant	0.5272*	(14.93)	0.5716*	(21.05)	0.5520*	(18.88)
R-Square	0.58		0.54		0.57	

Calculated by Authors
Note: *= at 1% level, **=at 5% level, ***=at 10% level

4.Results and Discussion

Table: 4.7 SELECTION PROCEDURE OF PANEL ESTIMATES FOR HUMAN DEVELOPMENT MODEL

Statistics	Chi-Value	Probability
Breusch and Pagan LM Test	107.19	0.0000
Hausman Test	6.60	0.2524

Calculated by Authors

Table: 4.8 DESCRIPTIVE STATISTICS FOR ENVIRONMENTAL DEGRADATION MODEL

Variable	Mean	Standard Deviation			Min	Max
		Overall	Between	Within		
Greenhouse Gas Emission	420443.1	821567	87392.3	110028.4	1467.6	2828846
Governance	31.90	16.02	16.96	2.44	2.94	58.54
Population Density	326.82	353.53	378.43	15.91	15.66	1128.09
Growth	6.63	3.39	1.91	2.89	1.06	21.02
Growth Square	55.34	69.46	33.94	61.81	1.11	441.87
Openness	-14.69	13.79	13.52	5.57	-53.14	1.03
Foreign Direct Investment	1.42	1.26	0.67	1.09	-0.07	6.17
Industrial Value Added	27.84	7.63	7.92	1.90	15.45	45.38
Agricultural Value Added	22.76	7.60	7.81	2.13	9.46	38.3

Calculated by Authors

Note: N=63, n=7 (Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka), T=9(2003-2011)

4.Results and Discussion

Table: 4.9 PANEL ESTIMATES FOR ENVIRONMENTAL DEGRADATION MODEL

Variable	Pooled	Fixed Effect	Random Effect
Governance	-9999.12 (-1.10)	-14542.54** (-2.45)	-9999.12 (-0.78)
Population Density	58.76 (0.28)	3589.52* (3.74)	58.76 (0.17)
Growth	204813.4** (1.99)	5255.47 (0.35)	204813.4** (2.06)
Growth Square	-10094.31** (-1.98)	-524.09 (-0.67)	-10094.31** (-2.10)
Openness	35816.53* (3.04)	1540.24 (0.47)	35816.53* (3.24)
Foreign Direct Investment	141052.7 (1.30)	28255.52*** (1.68)	141052.7 (1.54)
Industrial Value Added	34268.01 (1.59)	-10165.1 (-1.13)	34268.01 (1.19)
Agricultural Value Added	3539* (2.43)	-395.26 (-0.05)	3539*** (1.74)
Constant	-1513585** (-2.21)	-20392.23 (-0.04)	-1513585 (-1.61)
R-Square	0.2911	0.0047	0.29

Calculated by Authors
Note: *= at 1% level, **=at 5% level, ***=at 10% level

Table: 4.10 SELECTION PROCEDURE OF PANEL ESTIMATES FOR ENVIRONMENTAL DEGRADATION MODEL

Statistics	Chi-Value	Probability
Breusch and Pagan LM Test	0.00	1.0000

Calculated by Authors

5. Conclusion and Policy Recommendation

- This study hereby concludes that governance, capital formation, inflation and growth are even in a long-run relationship with each other but role of the governance for growth is not clear, however, a hypothesized role of inflation and capital formation is obvious.
- In case of human development of the region it is found out that role of governance is constructive and openness, foreign direct investment and inflation show a hypothesized role. However, growth affects pessimistically which is against the hypothesized relationship. Such a result is not surprising on account of high level of inequality in the region which point out that even if growth records of the region are satisfactory but same are not translated into the life of masses.

5. Conclusion and Policy Recommendation

- Environmental degradation of the SAARC region is in the phase of take off stage. As the growth is increased with increased economic activities of openness and agricultural productions the environmental degradation is increased and after a certain level of growth the environmental degradation is started to be reduced. Role of governance is again not clear.

- Governance has observed to be a positive role for sustainable development of the SAARC region. However, the role of governance is observed to be relatively less effective in comparison to its hypothesized role. This does not mean that in SAARC countries role of governance for sustainable development is not important but it could also lead to the conclusion that status of governance in this region is not satisfactory and hence is unable to influence sustainable development effectively.

5. Conclusion and Policy Recommendation

- The study suggests that governance of the SAARC region should have been improved for achieving a sustainable development.
- It is also suggested that focus should also be shifted towards controlling the inequality.
- Along with improvement in governance, it is also suggested that developing countries and specifically the SAARC region should make more efforts in data collection process.