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PANEL DATA ANALYSIS OF GROWTH, INEQUALITY AND POVERTY: EVIDENCE FROM SAARC COUNTRIES

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ABSTRACT

This paper empirically examines the impact of economic growth and income inequality on poverty for a panel of five selected SAARC countries[1], over the period of 1988-2009. There is no consensus on the growth, inequality and poverty (GIP) relationship in the SAARC region. Moreover, literature about the growth, inequality and poverty relationship in the SAARC region lacks the interpretation of results by taking into the account of pro-poor growth index. The study addresses the gap in the literature. The results of pooled least square method reveal that if there is one percent increase in economic growth reduces poverty by 0.05 percent. While one percent rise in income inequality decreases poverty by almost 0.78 percent. This phenomenon can be linked with the recent wave of privatizations in the developing countries. Public spending on education and foreign direct investment has shown a positive impact on poverty reduction process. Trade openness and increase in healthcare expenditure has found to be insignificant on poverty reduction. By using the fixed effect model, results reveal that poverty ratio in the five SAARC countries is apparently influenced by country specific effects.

Keywords: *Poverty, Growth, Income Inequality, Human Resource Development, Panel Data, SAARC countries.*

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[1] including Bangladesh, India, Nepal, Pakistan and Srilanka.

1. INTRODUCTION

Poverty, education and health are of vital importance and are on top priority of Millennium Development Goal (MDG, 2005) for human development. Poverty, education and health are the major concerns for governments, politicians, international donors and UN agencies in the SAARC region. The countries which have been successful in reducing poverty significantly have a sustainable high economic growth. As per empirical findings, high economic growth alone is insufficient for poverty reduction. The nature, pattern and sources of growth along with the means of distribution of income are of utmost importance from the viewpoint of developmental economists. The linkages between poverty and growth are highly complex. In classical economic writings of Smith (1776), Ricardo (1817) etc., income distribution is an important variable in the development of a nation. The development process is more employment oriented. As a result the growth trajectory is more equity oriented due to poverty is reduced. In this perspective, the human development is an integral to the growth process, because people have opportunities to choose among greater choice sets.

The concept of growth among neo classical economists does not consider the income distribution as an important variable. The market based growth process does not guarantee equity. Hence growth may in fact co-exist with widening inequality and poverty. It is, therefore, likely that human development may suffer for a long time period until the effect of growth percolates down to the poors. Health and education are the two main pillars of human capital in economic terms. Human Resource Development is defined as the total knowledge skills, creative abilities, talents and aptitudes of an organization's work force (Arya & Tandon, 1998). Thus, the concept of Human Resource Development (HRD) at the SAARC region refers to development of Human Resource (HR) with respect to educational attainment, health, nutrition, and self-development at the individual level. According to White (1975), the health is more important to the nation than its economic growth. Improved health in terms of higher expectancy of life means higher returns to the education as the working life of an individual expands (Shah, 1982). In addition, Rao (1991) mentioned that HRD is the process of helping people to acquire competencies, which enhances knowledge, skills and capacity in individuals.

Growth, poverty, inequality, education, and health are interrelated and the major concerns for governments, politicians, international donors and UN agencies in the SAARC region. The most important goal for the developmental effort has become poverty reduction, which can be achieved by economic growth and/or by the distribution of income (Kakwani and Son, 2004) and by proper utilization of social expenditure such as expenditure on education and health (Ocampo, 1998 and Shenggen, 2008). Poverty reduction through growth is termed as pro-poor growth (reducing poverty and inequality through economic growth). However, empirical findings confirmed that high economic growth alone is insufficient for poverty reduction. Growth is necessary but not the sufficient condition for poverty reduction. The nature, pattern, and sources of growth along with the means of distribution of income are of utmost importance. Poverty reduction through education and health is called Pro-Poor Education (poor benefit more than non poor) and Pro-Poor Health (poor benefit more than non poor) respectively. Usually public expenditure on such sectors is called social expenditure. According to Ocampo (1998), social expenditure is the most important component through which the State can

affect income distribution. For example, the greater allocation of resources to education makes it possible to improve the distribution of human capital in a society which has long run effect on income distribution.

Zaman *et al* (2009) investigate the pre and post reform poverty reduction in Pakistan during 1964-2006. This research aims to analyze Pakistan's poverty and inequality statistics in terms of pro-poor growth scenarios. The result reveals that economic growth alone does not guarantee sustained poverty reduction. The Government should form policies that are more directed towards pro-growth and pro-poor for the welfare of the state. Zaman et al (2009) investigate the legitimacy of the growth-inequality-poverty (GIP) hypothesis in the rural Pakistan by using the bounds testing approach. Result reveals that income inequality has a positive impact on rural poverty, whereas economic growth and post reform period are found to influence poverty negatively. Thus, this study supports the GIP hypothesis in the Pakistan economy. Zaman et al (2010) examine the poverty – growth relationship in the context of Pakistan. The results pertaining to impulse response analysis predict for next decade that one standard error shock in poverty will have a negative effect on both growth and income inequality. It is noticeable that poverty changes both income inequality and economic growth in short and long-runs.

South Asian countries have adopted different approaches for rural development. In the 1950s and 1960s efforts were centered on 'growth-first' models. The majority of regional economies in that period achieved robust growth but economic benefits did not 'trickle down' and majority of the population were trapped in hopeless poverty, rising unemployment and increased inequalities (Ghosh, 2000). In a study of 129 countries, Barro & Lee (1993) concluded that education levels have a strong explanatory capacity due to direct positive effects of education on growth rates. However, Benhabib & Spiegel (1994) showed that between 1965 and 1985, the growth rate of the human capital did not significantly explain the growth rate of the product per capita (See Magali, 2008). It shows that theoretical uncertainties exist in understanding the linkages between growth and human development.

Relationship between FDI and poverty reduction is segmented into the relationship between FDI and income growth on the one side, while growth and poverty reduction on the other. It is generally found that inflows of FDI encourage more rapid economic growth. FDI is a key vehicle to generate growth and reduce poverty. Blomstrom, (1996) find that MNCs play an important role for productivity and export growth in their host countries, but that the exact nature of the impact of FDI varies between industries and countries, depending on country characteristics and the policy environment. Studies that disaggregate the poverty population (for example, Ravallion (2004)), show that, depending on production, trade and consumption patterns, some poor positively and some negatively are affected by trade liberalization. The emerging consensus is that trade liberalizations in majority of cases worsened inequality (Cornia, 2004; Gunter & Vander, H. 2004). In number of studies, the relationship between trade policy, economic growth, poverty reduction and income distribution are exist by Dollar(1992), Ben-David(1993), Sachs and Warner (1995), Edward(1998),Frankel and Romar (1999), Dollar(2001) and, Dollar and Kraay (2001).

Introduction can be concluded that health and education is the major pre-requisite for human capital development. Every SAARC country has its own unique environment and constraints. Literature establishes the relationship between foreign direct investment (FDI) and poverty reduction. Few studies are indifferent

between trade liberalization and poverty reduction process. There is a deficiency in above quoted literature that sophisticated econometric techniques along with additional test of robustness are not employed with the data sets. This paper hopes to contribute to the existing literature by using pooled least square and least square dummy variable (LSDV) methods to strengthen the validity of relationship between poverty and growth with respect to pro-poor growth policies.

This paper is organized in five sections. Section 2 provides data source and methodological framework. The empirical results are presented in Section 3, while the final section concludes the study.

2. DATA SOURCE AND METHODOLOGICAL FRAMEWORK

There is no denying the fact that the economic growth is an effective anti-poverty tool. But the extent to which growth benefits the poor depends upon a number of factors. Bourguignon, (2000 & 2003) opines that sustained poverty reduction can be achieved through redistribution policies alongside economic stagnation, growth associated with progressive distributional changes will have a greater impact in reducing poverty than growth which leaves the distribution unchanged. There are two main causes for this. The first is simply the direct positive impact that progressive distributional change has on poverty reduction for any given rate of growth. There is, however, a second, indirect and positive impact of a fall inequality. Even in the absence of distributional change a given growth rate will have a larger poverty reducing impact if initial inequality is low.

Hence, reductions in inequality increase the elasticity of poverty reduction with respect to future growth, and progressive distributional change has both a contemporaneous impact on p[poverty and a lagged impact by increasing the rate of poverty reduction implied by future growth . Further, it is perfectly possible that regressive distributional change can offset the contemporaneous benefits of growth to the poor and reduce the poverty impact of future growth.

More formally,

$$P = P(y, L(p)), \quad (1)$$

Where *P* is a poverty measure (which for simplicity can be assumed to belong to the Foster-Greer-Thorbecke (FGT) (1984) class, *y* is per capita income and *L (p)* is the Lorenz curve measuring the relative income distribution. *L (p)* is the percentage of income enjoyed by the bottom $100\times p$ percent of the population.

Change in poverty can be decomposed into:

$$dP = \partial P / \partial y \; dy \; + \; \partial P / \partial L(p) dL(p). \quad (2)$$

After some straightforward manipulation (2) can be written as:

$$dP / P = \gamma dy / y + \phi dL(p) / L(p) \quad (3)$$

Where γ is the growth elasticity of poverty, which measures the percentage change in poverty that takes place when average income increases by one percentage point, and ϕ is the inequality elasticity of poverty,

which measures the percentage change in poverty as a result of a one percent change in the share of income of the lowest *pth* percentile.

In principle both γ and ϕ can be expected to be negative. That is, both growth and progressive distributional change will lead to poverty reduction with the relative importance of each factor given by the respective elasticities. For example, if $\gamma > \phi$, a one percent changes in income will have a larger impact on poverty reduction than a one percent reduction in inequality. In contrast, if $\gamma < \phi$ a one percent reduction in inequality will have a larger impact on poverty than a one percent change in income. Bringing together elasticities and magnitude of change one can also express the condition by which poverty will increase as:

$$\gamma dy / y < \phi dL(p) / L(p) \qquad (4)$$

Observe that (4) does not restrict growth to be negative. In principle it is possible for poverty to increase even when growth is positive. The lower the growth rate the more likely that poverty will increase when inequality increases.

Under the assumption that changes in inequality shift the Lorenz curve by a constant proportion of the difference between the actual share in total income accruing to each income group and equal shares. Kakwani & Son (2004) show that $\partial\gamma / \partial y < 0, \partial\gamma / \partial G > 0, \partial\phi / \partial y > 0, and \partial\phi / \partial G < 0$ where G is the Gini index. Both the impact of a given growth rate on poverty reduction and the impact of progressive distributional change on poverty reduction with the level of development and decrease with the level of inequality of the country. Pro-poor Growth Index has proposed by Kakwani & Pernia in 2000.

In order to study the impact of economic growth and income inequality on poverty for selected South Asian Association for Regional Cooperation (SAARC) countries, the study chooses International Financial Statistics (IFS), 2009; World Development Indicator (WDI), 2009; SHRDC report, 2008 and Economic Survey of Pakistan, 2009-10. The dependent and independent variables used in this study are listed in Table 1. Poverty is used as a dependent variable for the study. The Head count ratio is defined as the proportion of people below the poverty line i.e., 1.25 dollars per day i.e., 22.6%. The head count ratio is conceivably the most extensively used poverty measure. Therefore, the present study uses headcount ratio as a proxy for poverty (POV). The independent variables used in this study to test their relationship are constructed as follows: Economic Growth (GDP) is one of the explanatory variables in that model. As literature suggests that economic growth is a necessary condition for alleviating poverty but not a sufficient condition; according to Bourguignon (2003), sustained poverty reduction can be achieved through redistribution policies alongside economic stagnation, growth associated with progressive distributional changes will have a greater impact in reducing poverty than growth which leaves the distribution unchanged. We expect a negative relationship between economic growth and poverty as we support the pro-poor growth theories [(Kakwani & Pernia (2000), Kakwani & Son, 2004, McCullouch & Baulch (2001)].

The next variable is income inequality (GINI) which is a numerical measure of how disproportionately one variable is associated with another. GINI is a good index of income inequality which meets major criterion of transfer sensitivity. The experience of developing countries in the 1990s does not reveal any sign of a systematic tradeoff between measures of absolute poverty and relative inequality. Indeed, falling inequality

tends to come with falling poverty incidence. And rising inequality appears more likely to be putting a brake on poverty reduction than to be facilitating it (Ravallion , 2005).

The next variable which has received scant attention from economic theorists is the degree of openness (Harrison 1996). For trade openness of an economy, we use (Import + Export) as a share of GDP. Trade openness (TOP) is synonym for trade liberalization. The variable is expected to have a negative relationship with poverty. Foreign Direct Investment (FDI) is used to testify the financial openness which measures the medium and long-term ability of a country to attract investment from abroad. FDI plays a pivotal role in development of developing countries. We expect a negative relationship between FDI and poverty reduction.

The final variables used in the model relevant for this study are public expenditures on health and education. Both are interlinked with each other and used here as a proxy for 'the role of state'. We expect that public expenditures on health (HLT) and education (EDU) have a strong negative effect on poverty if such programmes are efficiently administered. All variables are in natural log form.

Table 1: Variables used for the Poverty-Growth Model

Variables	Symbol	Expected Sign
Dependent Variable:		
Poverty	POV	
Independent Variable:		
Economic Growth	GDP	Negative
Income Inequality	GINI	Negative/Positive
Health Expenditures	HEXP	Negative
Education Expenditures	EDEXP	Negative
Foreign Direct Investment	FDI	Negative
Trade Openness	TOP	Negative

There is a lack of panel data model to explain the relationship between poverty and economic growth in the SAARC context, so this paper uses panel data analysis to test this relationship in Bangladesh, India, Nepal, Pakistan and Srilanka during 1990-2009. In this paper, the following two separate methods are used: 1) pooled ordinary least squares (common constant method) and 2) the least squares dummy variables (LSDV).

The **common constant method** (i.e., also called the pooled OLS method) of estimation present results under the principal assumption that there are no differences among the data matrices of the cross-sectional dimension (N). In other words, the model estimates a common constant method implies that there are no differences between the estimated cross-sections and it is useful under the hypothesis that the data set is a priori homogenous. However, this case is quite restrictive; therefore, the inclusion of fixed and random effects in the method of estimation (see Asteriou and Stephen, 2007).

The model used to test the relationship between poverty and their explanatory variables are as follows.

Log (POV) = f log (GDP, GIN, EDU, HLT, FDI, TOP)

The general representation of the equation mentioned above is as follows.

$$Log(Y_t) = C + \beta_{1t}\log(X_{1t}) + \beta_{2t}\log(X_{2t}) + \beta_{3t}\log(X_{3t}) + \beta_{4t}\log(X_{4t}) + \beta_5\log(X_{5t}) + \beta_6\log(X_{6t}) + \varepsilon_t \quad (5)$$

Where:

Y_t = dependent variable;

C = intercept;

β_t = slope of the independent variables;

X_t = independent variables (GDP, GIN, EDU, HLT, FDI and TOP;

t = 1, 2…17 periods;

i = 1, 2…5 countries;

ε_t = error term;

β_1 = coefficient of economic growth;

β_2 = coefficient of income inequality;

β_3 = coefficient of public education expenditures;

β_4 = coefficient of public health expenditures;

β_5 = coefficient of foreign direct investment; and

β_6 = coefficient of trade openness index.

In the above model, the sign of β_1 is expected to be negative as we argue that benefits of increasing growth trickle down to the lower income strata. Similarly, β_2 is hypothesized to be positive or sometimes seem to be a negative sign as we argue that there is no sign of a systematic tradeoff between measures of absolute poverty and relative inequality relationship in case of developing countries. β_3, β_4, β_5 and β_6 all are expected to have a negative sign because growth is considered central or the unsurpassed course to reduce poverty, with the prerequisite that access to education, health, and social services are accessible to all by means of other policies.

In the **fixed effects method** the constant is treated as group specific. This means that the model allows for different constants for each group. The fixed effects estimator is also known as the least-squares dummy variables (LSDV) estimator because in order to allow for different constants for each group, it includes a dummy variable for each group. Consider the following model below:

$$y_{it} = (\beta_0 + \lambda_i) + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \xi_{it} \quad (6)$$

Where, λ now part of constant-but varies by individual.

3. RESULTS AND DISCUSSION

The current section deals with the results of the study which include panel econometric results for the model, and tests for robustness relevant for the study.

3.1. Panel Econometric Results

The model for the SAARC Country is selected on the basis of strong diagnostics and high value for the R-squared. The error terms of the variables of different time periods are also interrelated (autocorrelation) with each other. This disturbs the OLS assumptions of the model (Gujarati, 2003). The problem of

autocorrelation in the model was removed by giving Markov first order autoregressive treatment AR (1). The pooled least square results, given in Table 2, appear to be very good in terms of the usual diagnostic statistics. The value of R^2 adjusted indicates that 81% variation in dependent variable has been explained by variations in independent variables. F-value is higher than its critical value suggesting a good overall significance of the estimated model. Therefore, fitness of the model is acceptable empirically. The overall result suggests that all variables have a correlation proving the hypothesis. Coefficients of economic growth (GDP), education expenditures (EDU), even as income inequality (GIN) & foreign direct investment (FDI) are significant at 10 and 1 percent respectively.

Table 2: Pooled Least Squares Result of Selected SAARC Countries

Dependent Variable: log (POV)

Variables	**SAARC Model**
Constant	7.428 (8.42)*
Log (GDP)	-0.102*** (1.85)
Log (GIN)	-0.676 (-4.82)*
Log (EDU)	-0.209 (-1.89)***
Log (HLT)	0.089 (0.86)
Log (TOP)	0.152 (1.21)
Log (FDI)	-0.042 (-2.62)*
R-squared	0.78
Adjusted R-squared	0.76
Durbin-Watson	1.91
Mean Dependent Variable	3.87
F-statistic	47.4*

*Notes: The values of the coefficients are in the first row. Below are the values for t-statistics in parenthesis. Total number of observation of the model = 85. *, ** and *** Represents the significance of a variable at 1, 5 and 10 % significance level. LM and ARCH tests were applied and no evidence of serial correlation was found.*

The empirical results, given in Table 2, appear to be very good in terms of the usual diagnostic statistics. According to the result, if a one percent increases in economic growth reduces poverty by 0.1 percent. While, one percent increase in income inequality reduces poverty by almost 0.67 percent. Economic theory poorly explains the rise in inequality and the relation of this rise to poverty alleviation, possibly exacerbated by the recent wave of privatizations in the developing countries (Cornia, 1998).

The other results include public expenditure on health, education, trade openness and foreign direct investment. The result shows that 10 percent increase in public expenditure on education significantly decline the poverty by almost 2.09 percent which shows that education expenditures pay significant dividends in reducing poverty. The result is consistent with White, 1975, Shah, 1982, and Rao, T.V, 1991. Trade Openness and health expenditures did not significantly explain the overall poverty in SAARC region. FDI has a significant and positive effect on poverty reduction. It is a key vehicle to generate growth and a most important ingredient for poverty reduction process. This result is consistent with the previous researches e.g., Dollar & Kraay, 2000 and UNCTAD, 2002 report.

Further, fixed effects model captures all effects which are specific to a particular individual which do not vary over time. The findings of fixed effects method are given in Table 3. All coefficients signs are consistent with the theory. Coefficient value for GDP, TOP and FDI are found to be statistically significant as given by probability values. Adjusted R-square has quite high value showing strong relationship between the variables.

Table 3: Least Square Dummy Variable (Fixed Effects) Model

Dependent Variable: Log (POV)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log (GDP)	-0.184859	0.071425	-1.978214	0.0548
Log (GIN)	-0.042152	0.187528	-0.148523	0.9823
Log (TOP)	-0.343215	0.114259	-3.429856	0.0074
Log (EDU)	-0.321854	0.142587	-2.875634	0.0459
Log (FDI)	-0.102122	0.017853	-0.869285	0.8739
Log (HLT)	0.068534	0.087524	0.727227	0.8254
Fixed Effects				
BAN--C	5.012885			
IND--C	6.952386			
NEP--C	6.892753			
PAK--C	6.872398			
SRI--C	6.938654			
R-squared	0.842986	Mean dependent var		3.879658
Adjusted R-squared	0.823586	S.D. dependent var		0.298654
S.E. of regression	0.096831	Sum squared resid		0.618591
Log likelihood	90.856997	F-statistic		84.89522
Durbin-Watson stat	1.7429859	Prob. (F-statistic)		0.000000

Notes: The values for t-statistics in parenthesis. Total number of observation of the model = 85. LM and ARCH tests were applied and no evidence of serial correlation was found.

3.2. F-Test for Model Specification (Pooled OLS vs. Fixed Effects)

Before assessing the validity of the fixed effects method, we need to apply tests to check whether fixed effects i.e., different constants for each group, should indeed be included against the simple common constant OLS method. The null hypothesis is that all the constants are the same (homogeneity) and that therefore the common constant method is applicable:

$$H_0 : a_1 = a_2 = ...a_N \tag{7}$$

The F-statistic is:

$$F = \frac{R_{FE}^2 - R_{CC}^2 /(N-1)}{(1-R_{FE}^2)/(NT-N-K)} \tag{8}$$

Where R_{FE}^2 coefficient of determination of the fixed effects is model and R_{CC}^2 is the coefficient of determination of the common constant method. If F-statistical is bigger than the F-critical then we reject the null hypothesis.

The estimation of equation 8 shows that *F-statistical = 31.769*, therefore, we reject the null hypothesis of same constants. To compare the pooled OLS model with the fixed effect model, the result seems to indicate that the fixed effect analysis is better than the pooled OLS model. In other words, poverty ratio in the five SAARC countries is apparently influenced by country effects.

In order to detect the multicollinearity (variance inflation factor) is also performed to support the validity of the regression results. In case of VIF, if the result is below the 10 and Tolerance near to zero suggest no multicollinearity (Gujrati, 2003). In Table 4 results of VIF and tolerance factor is reasonably good. The values of variance inflation factor for the variables in the model ranges from 1.091 to 6.852 for income inequality (GIN) to GDP suggesting the absence of multicollinearity among the variables of the model.

Table 4: Values of Tolerance and Variance Inflation Factor (VIF) for the Selected SAARC countries

Variables	Tolerance	Variance Inflation Factor
GDP	0.145	6.852
GIN	0.847	1.091
EDU	0.428	2.991
HLT	0.329	3.824
TOP	0.301	3.880
FDI	0.180	4.239

The original model (i.e., common constant method) for the poverty-growth relationship shows that few variables are statistically insignificant which are already reported in Table 2. To improve the explanatory power of the independent variables we have tested the role of past poverty-growth policies by applying AR (1) treatment to the model. The result shows that at first lag, economic growth contributed to alleviate poverty by almost 1.5 percent from previous model (if 10 percent increase) while income inequality significantly alleviates the process of poverty reduction by almost 5.2 percent which is less than almost 6.7 percent than previous model. The remaining variables have no such change observed from previous model. It is presented below.

$$\log(Y_t) = C + \beta_1 \log(X_{1t-1}) + \beta_2 \log(X_{2t-1}) + \beta_3 \log(X_{3t-1}) + \beta_4 \log(X_{4t-1}) + \beta_5 \log(X_{5t-1}) + \beta_6 \log(X_{6t-1)} + \varepsilon$$

Log (POV) = 6.89 – 0.151 GDP – 0.52 GIN – 0.21 EDU + 0.09 HLT + 0.17 TOP - 0.06 FDI
(4.23)* (-2.39)** (-4.01)* (-1.74)*** (0.18) (1.01) (-1.81)***

$R^2 = 0.69$

*Notes: The values of the coefficients are in the first row. Below are the values for t-statistics in parenthesis. Total number of observation of the model = 85. *, ** and *** Represents the significance of a variable at 1, 5 and 10 % significance level.*

3.3. Robustness Tests:

a) Incremental Regression

The incremental regression is performed by removing individual independent variables from the model and by checking the effect on the value of R-squared. Among all the variables removed, income inequality has altered the value of R-squared to a highest degree (26% decreases in the portion of the dependent variable explained by independent variables) as the value for the R-squared changes from 8% to 42%. This substantial decrease in the value of the R-squared shows the importance of income inequality in the model. This importance is also highlighted in the regression result as the value of coefficient of the variable (0.676) is highest among all the variables. The result is presented in Table 5 below.

Table 5: Results of Incremental Regression removing Income Inequality

Models	SAARC
R-squared (Common constant method)	0.78
R-squared (least-square method: after the removal)	0.42

b) Endogeneity Test

The second robustness test used in this study is the test for endogeneity. This test is performed to make the results of the study robust. The possibility of reverse causation from poverty reduction to higher economic growth is raised by the extensive literature on the impact of initial income distribution on subsequent economic growth. Where such a relationship exists it raises the possibility of endogeneity in our model with SAARC regional poverty reduction in part causing regional growth. In the first step of this process (i.e., common constant method), the relationship of the poverty (POV) with all the independent variables (GDP, GIN, EDU, HLT, FDI and TOP) is tested and the error term (residual) is calculated. In the second step, the relationship of the GDP (dependent variable) with all the independent variables including initial income level and the calculated error term (residual) is tested. We have found no relationship of residual with the GDP which shows that there is no endogeneity in the poverty-growth relationship model in SAARC region and the results of the model are robust (Maddala, 2001). The result is presented in Table 6.

Table 6: Least Square Endogeneity Test for SAARC region

Dependent Variable: log (GDP)

Variables	SAARC Model
Constant	4.298 (3.98)*
Log (GDP(-1))	0.289 (3.99)*
Log (GIN)	-0.689 (-4.892)*
Log (EDU)	1.042 (4.98)*
Log (HLT)	-1.097 (-5.19)*
Log (TOP)	-0.398 (-3.17)*
Log (FDI)	0.299 (6.11)*
Residuals	0.197 (0.84)
R-squared	0.95
Adjusted R-squared	0.93
Durbin-Watson	1.67
Mean Dependent Variable	11.89
F-statistic	112.9*

*Notes: The values of the coefficients are in the first row. Below are the values for t-statistics in parenthesis. Total number of observation of the model = 85. *, ** and *** Represents the significance of a variable at 1, 5 and 10 % significance level.*

3.4. Durbin's h test in the presence of lagged dependent variables

The Durbin Watson test is not applicable when least square model includes lagged dependent variables as explanatory variables. The result of h-test shows that *h = 1.0682887* which would be the less that the *z-critical = 1.96,* we fail to reject the null hypothesis and conclude that this model does not suffer from serial correlation.

4. SUMMARY AND CONCLUSION

The objective of this paper is to examine the growth, inequality and poverty (GIP) hypothesis in the context of selected SAARC countries. There are two different methods are employed to testify this nexus. One is the Pooled least square method and other is least square dummy variable (i.e., fixed effects method). The pooled results indicate that if there is one percent increase in economic growth reduces poverty by 0.102 percent. While one percent increases in income inequality reduces poverty by almost 0.676 percent. The other

results show that public spending on education and foreign direct investment has a strong positive impact on poverty reduction. However, trade openness and health expenditures have an insignificant relationship with the poverty reduction. Model specification test i.e., F-statistics rejects the null hypothesis of no individual country specific shocks in the SAARC region. It is also proved by fixed effect model which shows that poverty ratio in the selected SAARC countries is apparently influenced by country specific effects.

SAARC countries have to focus on Foreign Direct investment policies, which can favor technology transfer plus foreign exchange contribution. Each country has to develop their human capital for sustainable economic growth. SAARC countries have to review trade liberalization models in relevance with WTO for gaining a competitive advantage. The future research can be made specific to education, healthcare and purchasing power parity in a broader context of South-East Asia.

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