

# A PANEL REGRESSION ANALYSIS OF POVERTY INCIDENCE AMONG SOUTH ASIAN COUNTRIES

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## Abstract

Economies reflected an industrial progression for human development, sustainable resources and better performance to have an impact in alleviating the poverty prevalence of the entire populace. Thus, the study had used the indexes of Human Development and Competitive Industrial Performance as predictors for poverty incidence across South Asian Countries. Specifically, it directed to generate a panel regression model on the poverty occurrence exhausting the factors as mentioned earlier. Based on the result, almost all of the countries in South Asia have consistently displayed low scores in both HDI and CIP index for more than a decade. The panel regression analysis implicates HDI and CIP can collectively influence poverty incidence. Further, the generated model forecasts an increasing poverty incidence rate for the region.

**Keywords:** poverty incidence, regression analysis, human development

## 1.0 Introduction

Poverty is a global dilemma that long-term tormented humanity and has been a persistent concern of governments and international organizations (Chen et al., 2015). A multitudinous literature has exemplified causes of this common problem. Most of them are related to the economy (Diao & Pratt, 2007; Itzigsohn, 2010), infrastructure (Freeman, 2000; Ali & Pernia, 2003; Ogun, 2010), education (Awan et al., 2011; Cremin & Nakabugo, 2012), environment (Boj et al., 2004; Ashley & Mitchell, 2009), social factors (Durrani et al., 2011), racial discrimination (Orfield, 2005), natural disasters (Freeman, 2000; Rodriguez-Oreggia et al., 2013), war (Djankov & Reynal-Querol, 2010; Justino, 2012), government corruption and chaotic management (Chetwynd et al., 2003; Orr, 2002). Moreover, poverty is also associated to individual factors, such as reduced health (Santana, 2002; Wagstaff, 2002; Fan & Zhang, 2008), drug addiction (O'Higgins, 1998; Chesang, 2013), and even being a single mother (Porter & Dupree, 2001). However, recent papers have emphasized that poverty is a multidimensional issue (Rippin, 2010; Alkire & Santos, 2013; and Thorbecke, 2013). Thus, the researchers were motivated by this recommendation to focus on the way the multidimensional aspect of poverty should be measured and aggregated.

There is a considerable agreement that poverty is a multidimensional problem about the lack of essential basic needs or basic capabilities. Way back 1990s, data on attributes except income have become progressively accessible. The multidimensional approach is thus more

than ever required to well comprehend the performance of a given country against poverty reduction (Bibi, 2005). However, it is impossible in practice to obtain empirical observations on all these existing data. Hence researchers of this study had to reduce poverty to a two-dimensional aspect. This study had looked into the macro lens of a country regarding the competitive ability of its manufacturing industry and the capability of its people.

Competitiveness of manufacturing industry is observed as one of the primary indicators of long-run viable progress of a country (Balkyte & Tvaronavi?iene, 2010). Therefore it is vital to consider the comparative positions in terms of competitiveness and determinants of competitive ability among countries. On the other hand, the competence of available manpower is also equivalently imperative for a workable development of a country (Rindermann et al., 2009; De Vos et al., 2011). Thus, the researchers used the Competitive Industrial Performance (CIP) Index and Human Development Index (HDI) in predicting the Poverty Incidence across South Asian Countries to provide the dearth of literature from which these two indices were underutilized. The study is delimited in South Asian Countries considering the spatial pattern of poverty incidence. Many researchers have proved that poverty incidence follows a perceptual structure, placement, or arrangement (Jha, 2000; Daimon, 2001; Minot & Baulch, 2005; Okwi et al., 2007). These patterns were recognized because of their arrangement, either in a line or by clustering of points.

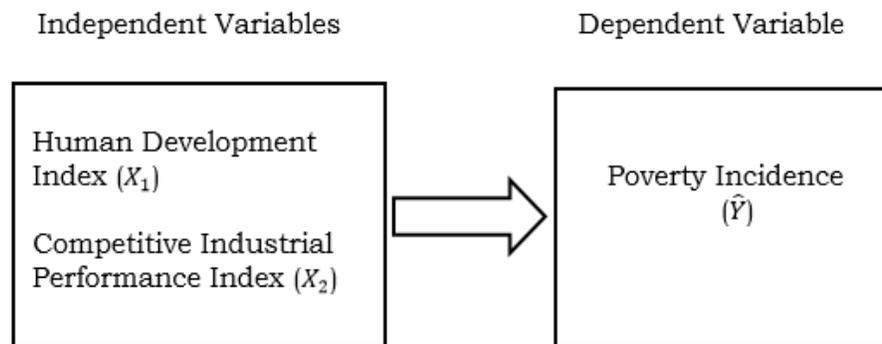


Figure 1: Conceptual Framework for Poverty Incidence

As indicated in Figure 1, this study considered into the potentials of using the Human Development Index (HDI) and Competitive Industrial Performance (CIP) Index as factors in predicting Poverty Incidence across South Asian countries. The concept of the study is anchored on the following theoretical considerations:

- Social Exclusion is the course in which characters are blocked from (or denied full access to) several rights, chances and means that are commonly accessible to adherents of a diverse group, and which are essential to social integration and execution of human rights within that specific group (Byrne, 2005) (e.g., civic engagement, democratic participation, due process, employment, healthcare, and housing). Once social exclusion is highly evident, HDI believes to be degraded. Further, the outcome of this social exclusion boils down to poverty since the affected

entities are prohibited from partaking fully in the economic, political, and social life of the civilization in which they are part with (Young, 2013).

- Structural Change Theory concentrated on the necessity for countries to transmute their structures towards industrial movement, through high efficiency of labor, deviate from agriculture, with low productivity of labor (McMillan & Rodrik, 2011). From this study, improving the CIP Index believes the reduction of poverty incidence.

## 2.0 Methodology

This part outlines the research methodologies that were used in conducting this study. It is divided into the following sections: the variables and measures, sources of data, and the data analysis.

### 2.1 Variables and Measures

The variable of interest in the research is on how CIP and HDI influence the poverty incidence of the South Asian Region. As defined by ADB and as utilized in this study, poverty incidence refers to the proportion of the population underneath the national poverty line. If the income of a citizen falls below a level needed to sustain a least tolerable standard of living, then such citizen is counted as part of the population below the general poverty threshold (Asian Development Bank [ADB], 2006).

CIP is an index that builds on the concept of competitiveness which emphasizes a countrys manufacturing development, implying that industrial competitiveness is multidimensional. Industrial competitiveness is described as the capabilities of countries to intensify their existence in international and local markets while emerging activities and sectors with advanced technology and greater value added content (United Nations Industrial Development Organization [UNIDO], 2002). In the UNIDOs report (2019), the CIP Index can range between 0 and 1, where the higher level of CIP index indicates a more competitive country and vice versa. In the same report, UNIDO also categorized that a CIP index below 0.1 is classified as low while above 0.50 are countries with high CIP scores.

On the other hand, Human Development Index, as demarcated by United Nations, is an instantaneous measure of average accomplishment in important extents of human development: being knowledgeable, having a decent normal of living and a long and healthy life (United Nations Development Programme [UNDP], 2003). A country marks greater HDI when the education level is advanced; the GDP per capita is higher, the lifespan is higher, the fertility rate is lower, and the inflation rate is lower. The HDI is expressed as a number between 0 and 1, wherein the higher a countrys HDI score, the higher it is level of human development and vice versa (UNDP, 2015). Adding to, UNDP (2018) classified HDI according to ranges: very high (0.894-1.0), high (0.757-0.893), medium (0.645 to 0.756) and low (below 0.645).

### 2.2 Sources of Data

The database used in this study is taken from the combination of different statistical sources compiled by the organizations namely; Asian Development Bank (ADB), United

Nations Development Programme (UNDP) and United Nations Industrial Development Organization (UNIDO). Due to the availability of information, the period of study is from 2005 to 2015, and the data obtained are reported annually. Among the eight countries in the South Asian Region, Bhutan was not included as part of the samples in this study since UNIDO has not included the said country in their database for CIP index. Also, data for the years 2006 to 2008 were not included in this study since the ADB database do not have poverty incidence data for the said years.

## 2.2 Data Analysis

This study used seven (7) cross-sectional units representing the seven (7) countries under the South Asian Region, and with a time-series length of 8 years, as such, the total number of observations in this study reached to 56 samples. It is tantamount to say that the type of data used in this study has a panel characteristic. With this, panel regression analysis is employed in this study to estimate the relationship poverty incidence to CPI and HDI. Panel regression analysis is used in this study since it sets the most advantageous method in determining relationships with data combining the features of both cross-section and time series data (Baltag, 1995; Hsiao, 2007; Gujarati, 2012) and it is a method used for most of the poverty studies with the aforementioned data structure (Betti et al., 2002; Bhide and Mehta, 2003; Ghosal, 2012; Bah, 2015).

This study put forward the procedure of Gujarati (2012) on the considerations in utilizing panel data regression analysis method. Gretl software, a free package for econometric analysis, was used in this study to run the assumptions and generate the estimates for the panel data regression analysis. Before regressing, variables were transformed into log form to have a more straightforward interpretation and comparison of the size of the estimated coefficients and to secure the assumption of regression on heteroscedasticity (Torre and Myrskyl, 2011). Also, assumptions on the normality of residuals, no collinearity relation between independent variables and no serial autocorrelation of errors were diagnostically checked in this paper using the available tools in the Gretl software.

The following equation expresses the poverty regression model for this study:

$$\ln Y_{it} = \beta_0 + \beta_1 \ln CIP_{it} + \beta_2 \ln HDI_{it} + \epsilon_{it}$$

where:

$\ln Y_{it}$  = log of Poverty Incidence made in the country “ $i$ ” in the time “ $t$ ”

$\ln CIP_{it}$  = log of CIP for country  $i$  at time  $t$

$\ln HDI_{it}$  = log of HDI for country  $i$  at time  $t$

$\epsilon_{it}$  = term of random error

$\beta_0, \beta_1, \beta_2$  = parameters of the study

As emphasized by Gujarati (2012), there is a need to compare whether the model is better to be presented having a fixed effects model (FEM) or random effects model (REM).

As suggested by Gujarati (2012), Hausman test was used in this study to decide on which is the appropriate model. The null hypothesis underlying the Hausman test is that FEM and REM do not differ substantially. His test statistic has an asymptotic (i.e., large sample) chi-square distribution with degrees of freedom (df) equal to the number of the independent variable in the model. If the computed chi-square value surpasses the critical chi-square value for specified df and the level of significance, conclusively that REM is not applicable due to random error terms.

#### 4.0 Results and Discussion

This section discusses the results of the data gathered. Graphs and tables were also used as a tool to present the data that were collected.

##### 3.1 The Trend of Poverty Incidence, CIP and HDI

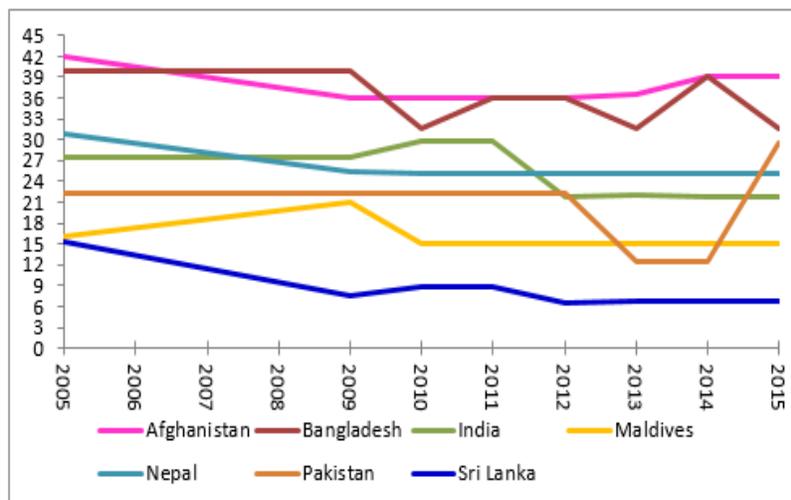


Figure 2: Poverty incidence trend of South Asian Region from 2005 to 2015

Figure 2 illustrates that Sri Lanka has a decreasing trend of poverty incidence rate across 15 years and is the lowest in the South Asian Region. On the other hand, Afghanistan and Bangladesh are the top two countries that consistently have a high poverty incidence rate among the countries in the South Asian Region. Pakistan shows a more fluctuating trend among all the countries wherein, there is a sudden drop in poverty rate in 2013 and had a drastic increase by 2015. Meanwhile, Nepal displays a more static trend of poverty incidence compared with the other countries. This implies that trends of poverty incidence across countries have different behaviors.

Figure 3 denotes that India has the highest CIP index score and substantially has increasing index scores from 2005 to 2015. On the other hand, Afghanistan, Maldives, and Nepal are consistently in the top bottom across all the years. It is evident that the CIP index scores for all of the countries, except India, more likely display a static trend for more than a decade. It should be noted that for the past 15 years, all of the countries under South Asia have CIP index scores below 0.1. This implies that the seven countries have low

competitiveness in terms of manufacturing development.

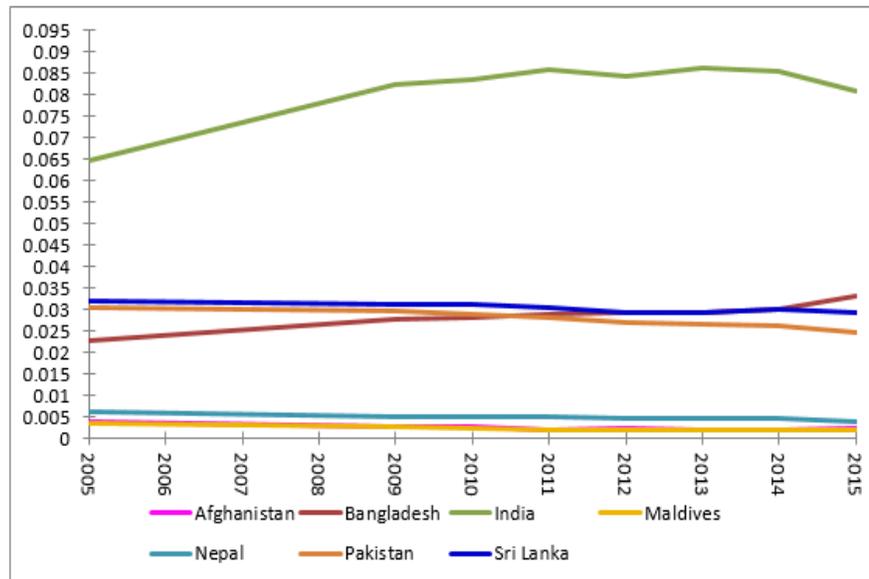


Figure 3: CIP trend of South Asian Countries from 2005 to 2015

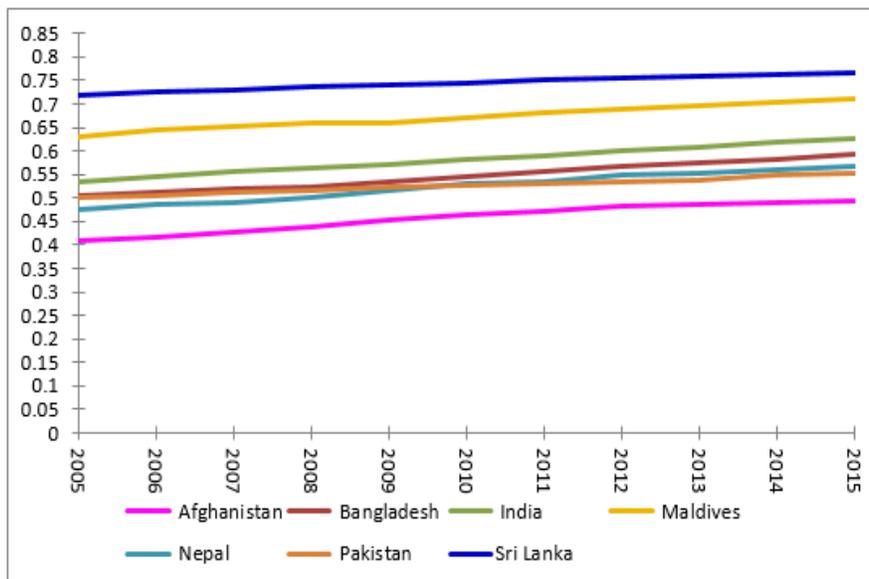


Figure 4: HDI Trend of South Asian Countries from 2005 to 2015

The figure above illustrates that the HDI scores for all the countries in the South Asian Region exhibit an increasing trend. Impressively, Sri Lanka and the Maldives have medium HDI scores across the years. However, the rest of the five (5) countries have HDI scores below 0.6 for 15 years, which implies that these countries are classified to have low human development. This further implicates that these countries have a less advanced education level, lower GDP per capita, lower lifespan, higher fertility rate, and higher inflation rate.

### 3.2 The Estimated Relationship of CPI and HDI to Poverty Incidence

#### Diagnostic Checking

Diagnostic checking of the assumptions of the panel regression analysis is presented to determine the adequacy of the identified model. It is essential to evaluate the aptness of the generated model for the said data and testing it to see whether it satisfies the required assumptions for its appropriateness. The data analysis utilized the different formal tests and generated the results from Statistical software.

The chi-square value for the normality of residual test resulted in 2.35231 with a p-value of 0.308462, which is higher than 0.05 level of significance. Hence, the error term is normally distributed. The result implies that the distribution of the error terms of the identified model for the number of poverty incidence is normal. Thus, few constraints linked with a violation of the normality assumption have been eliminated, such as it does provide to inefficiency or bias in the regression model (Statistics Solutions, 2013a).

In testing the constancy of variance, Breush-Pagan test was utilized. The model generated a statistic that yielded a value of 0.570 with a p-value of 0.805, which shows a not significant result. This finding indicates that the variance of error terms of the identified model is constant. Thus, it satisfies the assumption of homoscedasticity. A more severe problem associated with heteroscedasticity that the standard errors are biased have been disregarded (Statistics Solutions, 2013b).

For the multicollinearity of independent variables included in the model, the Variance Inflation Factors values of the two independent variables are both equal to 1.044. These all yielded values that are less than 10. Thus, this indicates that there is no presence of multicollinearity among the independent variables in the identified model, which means the prediction is accurate, and the overall R<sup>2</sup> (or adjusted R<sup>2</sup>) quantifies how well the model predicts the dependent variable (Paul, 2014). In this study, the model will estimate the poverty incidence.

The Wooldridge test was used in this paper to examine the serial correlation in the model. Its analysis yielded a p-value of 0.21. The result implies that there is no first-order serial autocorrelation in the model. Thus, accuracy managed to increase significantly and substantially, and errors of inference tended to drop significantly and substantially since final scores were excluded in the data analysis (Osborne and Overbay, 2004).

Finally, the Hausman test statistics yielded a value of 2.28687 with a p-value of 0.318722. As such, Random-effects model is more appropriate in this study. The result implies that the unobserved variables are assumed to be uncorrelated with (or, more strongly, statistically independent of) all the observed variables (Williams et al., 2018).

#### Model Building for Poverty Incidence

Table 1 presents the parameter estimates of the model for poverty incidence using panel regression. It shows the outcome in identifying independent variables that will predict the poverty incidence.

Table 1 reports the results of the panel regression of logged values of CIP and HDI on

Table 1. Parameter Estimates of the REM for Poverty Incidence

Model	$\beta$ Coefficients	Std. Error	<i>t</i> -statistic	Prob. Value
Constant	1.85887	0.448253	4.1469	0.00012
CIP	-0.035147	0.078715	-0.4465	0.65705
HDI	-1.94867	0.437623	-4.4528	0.00004
F-Statistics <i>P</i> -value				0.00000
Adjusted R-Square				0.68017

the logged values of poverty incidence rate. Based on the F statistic, it can be concluded that collectively, the HDI and CIP are highly statistically significant, because its p-value is less than 0.01 level of significance. The adjusted R2 value of 0.68017 implies that the contribution of the identified independent variables accounts for 68.02% of the total variation in poverty incidence rate (Y). Therefore the generated model in this study is

$$(\hat{Y}) = 1.85887 - 0.035147CIP - 1.94867HDI$$

Both CIP and HDI coefficient have a negative sign, but CIP is not statistically significant, suggesting that the importance of CIP on Poverty incidence is small. HDI, on the other hand, is strongly and negatively associated with poverty incidence. This result implies that a decrease in HDI by 1% on the average, poverty incidence rate goes up by about 1.95%, holding all other factors of constant.

This study had solidified the findings of Jahan (2011), Gallardo (2009) and Madan (2012) on the negative relationship between HDI and poverty incidence. The study put forth that advance education, better health, and higher income (components of HDI) can significantly decrease poverty incidence. On this note, the welfare of the human person, realized in its totality, must intrigue policy-makers and their executives since it is evident that health intervention can produce economic gains for patients and national economies (Garau et al., 2015), good health of a person turns into his riches, and his skills improved through prudently deliberated educational programs and responsible socialization that provide a vital factor in production (Oyeshola, 2007). In this respect, his several endeavors add to the wealth of his nation. Conversely, when well-being and educational facilities are overreached, expansive quantities of society remain an advantage for goods and services. However, the rest may constitute a chronic obligation, particularly amid any hardship the nation may experience. Therefore, the development strategy should be people-centered, and then community participation must be manifested in the process.

## 5.0 Conclusion

This study had generated a new hypothesis that human development and competitive industrial performance index (the HDI and CIP) can collectively influence poverty incidence

rate for the South Asian Region. In other words, if both HDI and CIP index will improve in the South Asian Region, the poverty incidence will be drastically reduced, holding all other factors constant. Furthermore, across 15 years, almost all of the countries in the South Asian Region displayed low scores in both HDI and CIP index. Given such and from the panel regression results of this study, this forecasts an increasing poverty incidence rate for the region.

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