Determinants of Human Development Index: A Cross-Country Empirical Analysis

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Abstract—The Human Development Index is a statistical tool used to measure countries overall achievements in its social and economic dimensions. This paper tried to find out major factors affecting Human Development Index like health index, education index and income index. The objective of this study is found out the empirical findings and trend of human development across countries, regression analysis of determinants factors and region wise analysis of human development index.

Index Terms—Human development index (HDI), A cross country analysis.

I. INTRODUCTION

The Human Development Index (HDI) is a composite statistic of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development. A country scores higher HDI when the lifespan is higher, the education level is higher, the GDP per capita is higher, the fertility rate is lower, and the inflation rate is lower.

II. LITERATURE REVIEW

HDI is the abbreviated as Human Development Index. It was developed and launched by Pakistani economist Mahbub-ul-Haq, followed by Amartya Sen, an Indian economist, in 1990. Human Development Index, HDI, is a comprehensive tool devised by the United Nations for measuring the levels of social and economic developments of the different countries and ranking them accordingly. It is a comparative measure of life expectancy, education, literacy and standard of living. Essentially, Human Development Index, HDI, makes use of four parameters for measuring and ranking countries according to their social and economic development which includes the Life Expectancy at Birth, Expected Years of Schooling, Mean Years of Schooling and Gross National Income per Capita.

Older versions of the HDI were calculated using the following indicators: I) Health – Life expectancy at birth, II) Education – measured by adult literacy and the combined primary, secondary and tertiary enrolment ratio and III) Income – measured by GDP per capita (PPP US$). Newer versions in 2010 Human Development Report (HDI) combines three dimensions: I) A long and healthy life: Life expectancy at birth, II) Education index: Mean years of schooling and Expected years of schooling and III) A decent standard of living: GNI per capita (PPP US$). There are six basic pillars of human development: equity, sustainability, productivity, empowerment, cooperation and security.

III. DATA AND METHODOLOGY

Countless factors affect Human development index at the individual level (e.g. health, income, education, inequalities, inflation etc). Education should have a positive effect on HDI because as education increases so does the knowledge of how to lead a healthier life. This knowledge might, for example, take the form of improved nutrition or reduced exposure to various health risks, such as indoor pollution exposures. Education is measured by the education index. In these analysis, Total literacy rate has been taken as proxy of
Disposable income is expected to be positively related to HDI for diverse reasons. As disposable income increases people have more resources for better shelter, food, and medical care. Again, countrywide data might offer some advantages over individual data: a wealthy person living in a poor country is unlikely to have the same access to quality food and medicine as a wealthy person living in a wealthy country. Since income is highly correlated with many other categories that would affect HDI (e.g. education, life expectancy), it is also held constant to estimate, without bias, the specific effects of those variables.

Countries with similar average GDP per capita often have large variance among individuals, hence greater or lesser inequality. Holding GDP per capita constant, greater inequality should have a negative effect on life expectancy. The Lorenz curve would be the better proxy for inequality but, due to lack of data, the gini coefficient is used instead.

The variables described above were acquired from the Human Development Report. The HDI, which is commissioned by the United Nations Development Program (UNDP), supplies numerous statistics for 188 countries. Seven variables for cross country analysis have been extracted like GDP per capita, literacy rate, life expectancy, inflation rate, Co2 emission, fertility rate, Gini Index. The descriptive statistics of the variables, regression analysis and variable key for the empirical analysis have been explained in the following section.

IV. RESULTS AND EMPIRICAL FINDINGS

Here following model has been used to explain variation in Human development index (HDI) among sample countries.

\[
\text{HDI} = b_0 + b_{1}\ln\text{GDP} + b_{2}\ln\text{Life Expectancy} + b_{3}\ln\text{Literacy Rate} + b_{4}\ln\text{Inflation Rate} + b_{5}\ln\text{Fertility Rate} + b_{6}\ln\text{Co2} + b_{7}\ln\text{Inflation Rate}
\]

The natural log of the all variables helps account for their diminishing marginal return to Human Development Index (HDI). Inflation rate is left out of this model because it is reasonably proxied by other variable like GDP per capita. It is dropped due to lack of significance.
Variable description:

Human Development Index (HDI): Human Development Index is an index used to rank countries by level of "human development". It contains three dimensions: health level, educational level and living standard.

Life expectancy at birth (years) (InLifeExpectancy) : The average number of years a newborn child would live if current mortality patterns were to stay the same.

Adult (15+) literacy rate (\%),(InLiteracyRate) (\% of people ages 15 and above): Adult literacy rate is the percentage of people ages 15 and above who can, with understanding, read and write a short, simple on their everyday life.

Total Fertility rate (Children per woman) (InFertilityRate): The number of children that would be born to each woman with prevailing age-specific fertility rates.

GINI index (InGini): Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

Inflation (annual \%) (InInflationRate): Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.

CO2 emission total (inCo2) : kg per 2005 PPP $ of GDP

HDI (Human Development Index) can be categorized into four categories like Very high HDI, High HDI, Medium HDI and Low HDI based on Index. In figure 4.1, the mean value of all determinants factors are given based on four categories. It can be observed that higher the life expectancy, Education index and GDP per capita of the countries, higher the HDI. Similarly higher the fertility rate, Gini index (more inequality), inflation rate and CO2 emission (environmental factor), lower the HDI.

In figure 4.2, the result of regression analysis has been given in the table. Apart from inflation rate, all variables are significant at 95% confidence interval, which can be observed from p-value and t- ratio of respective all independent variables. The sign of coefficient of independent variables shows either positive or negative relationship with dependent variable. R-squared is a statistical measure of how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determination for multiple regression. The R- squared value and adjusted R- squared value are 0.9613 and 0.9571 respectively. The interpretation of R – squared represents as 96.13\% of HDI can be explained by explanatory variables like GDP per capita, literacy rate, life expectancy, Gini index, fertility rate and CO2 emission. Higher value of R- squared, more goodness of fit.

In figure 4.3, HDI can be classified into worldwide regions. Europe & central Asia and Latin America & the Caribbean have highest 0.748 human development index, while south Asia and Sub-Saharan Africa have lower HDI 0.607 and 0.518 respectively. Education index is combination of expected years of schooling and means years of schooling. HDI is a geometric mean of Life expectancy at birth, Education index and Gross national income (GNI) per capita.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Human Development Index (HDI)</th>
<th>Life expectancy at birth</th>
<th>Expected years of schooling</th>
<th>Mean years of schooling</th>
<th>Gross national income (GNI) per capita (2011 PPP $)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>years</td>
<td>years</td>
<td>years</td>
<td>2014</td>
</tr>
<tr>
<td>Arab States</td>
<td>0.686</td>
<td>70.6</td>
<td>12</td>
<td>6.4</td>
<td>15,722</td>
</tr>
<tr>
<td>East Asia and the Pacific</td>
<td>0.71</td>
<td>74</td>
<td>12.7</td>
<td>7.5</td>
<td>11,449</td>
</tr>
<tr>
<td>Europe and Central Asia</td>
<td>0.748</td>
<td>72.3</td>
<td>13.6</td>
<td>10</td>
<td>12,791</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>0.748</td>
<td>75</td>
<td>14</td>
<td>8.2</td>
<td>14,242</td>
</tr>
<tr>
<td>South Asia</td>
<td>0.607</td>
<td>68.4</td>
<td>11.2</td>
<td>5.5</td>
<td>5,605</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>0.518</td>
<td>58.5</td>
<td>9.6</td>
<td>5.2</td>
<td>3,363</td>
</tr>
</tbody>
</table>

*Source: Human Development Report - 2014

V. CONCLUSION

In this paper, we conclude about determinant factors of human development index (HDI) like GDP per capita, Literacy rate, life expectancy at birth, Gini index, fertility rate and CO2 emission are significant in empirical regression analysis. In region wise analysis, we can observed that Europe & central Asia and Latin America & the Caribbean have higher human development index, while south Asia and Sub-Saharan Africa have lower human development index. The improvement in HDI can be achieved through three
dimension – Education index, Income index and Health index.

REFERENCES


