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Original Research Article

Trade Openness and Poverty in India: A Time Series Analysis

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Abstract

This research investigates the empirical linkage between trade openness and poverty in India through a comprehensive three-stage model approach. In first stage descriptive statistics, correlation matrix analysis and unit root tests are used to analyse the characteristics, nature and stationarity of the selected variables. Further, in the study Autoregressive Distributed Lag (ARDL) co-integration model to explore both long-run and short-run relationships between trade openness and poverty. Some post estimation test including the Breusch-Godfrey LM test, White heteroskedasticity test, and the Ramsey RESET test in the last stage. The empirical findings of the study show that there is positive correlation between trade openness and poverty (HDI). In the long run, trade openness, foreign direct investment (FDI), and exchange rate have significant impacts on poverty reduction, while inflation rate and GDP per capita exhibit mixed effects. Impact of FDI and Trade Openness (TO) is positive on poverty reduction, while exchange rate, inflation rate, and GDP per capita show varying impact on poverty. The study suggests that policymakers should consider fostering trade openness and addressing other economic factors to effectively reduce poverty in the country.

Keywords: Poverty, Trade Openness, HDI, Economic Growth, ARDL (Autoregressive Distributed Lag) Model.
JEL codes: E31, F21, F310, I32, O11.

1. INTRODUCTION

Poverty is a situation where an individual is unable to fulfil basic needs such as food, clothing and accommodation. In addition to this, he/she restricts access to social and economic infrastructure, lacks productive jobs, skills, possessions, and has low self-esteem making it impossible for him/her to fulfil his/her social and economic obligations (education, health, potable water, sanitation, etc.). Trade Openness refers to reducing limitations or barriers to the free exchange of commodities among countries. The eradication of these limitations is stated as "free trade". Trade Openness comprises the decline in tariffs (duties and charges) and non-tariff hurdles (like guidelines of licensing, quotas, and other requirements). It is a key factor in controlling greater and quicker growth rates. Although trade liberalization (openness) plays an important role in economic growth, the influence of trade openness on declining situation of poverty remains unclear. The two basic arguments about the effects of trade openness on poverty are the static effect and the dynamic effect (Bhagwati and Srinivasan, 2002). According to the Samuelson hypothesis, when trade openness (TO) increases, the real income of the abundance factors expands, thereby decrease in rate of poverty. According to Krueger theory, trade reforms or policies must be pro-poor, particularly in emerging nations like India where the proportional advantage is more expected to occur over the development of unqualified labor-intensive techniques. In practice, governments execute various limitations or hurdles to labor mobility entry and exit (Topalova, 2007). A decrease in poverty can only be constant if development of economy coincides with through improved efficiency, which is only achievable by the liberalization of trade. From the literature, it was found that liberalization promotes in the elimination of poverty in countries that are developing (Li *et al.*, and Wang *et al.*, 2022). According to Gnangnon (2021), trade openness reduces poverty in developing economies such as India. Conversely, some evidence are against [Dollar and Kraay (2002) and Fambeu (2021)] are found that there are either insignificant or no impact on poverty which concludes that only trade policies are not alone sufficient in poverty reeducation but other factors also require to reduce poverty. India is a developing country, and though its economy has continuously grown over the years, still poverty is a problem that has been significant throughout with a recent decline in the population below

the poverty line. Since the 2000s, India has made outstanding progress in decreasing absolute poverty.

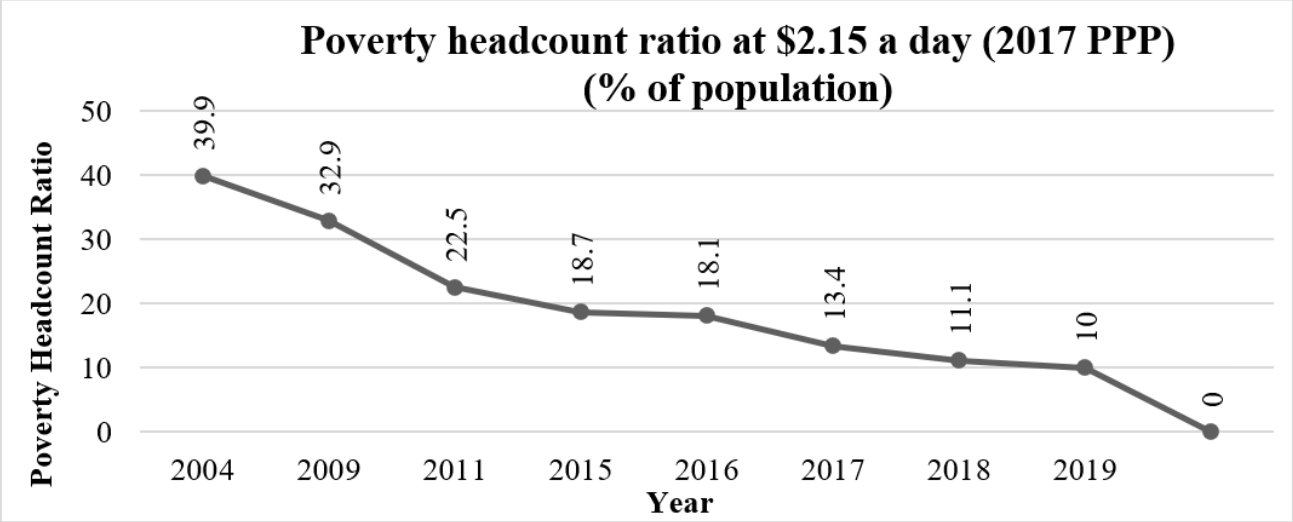

Figure 1: Graph of Poverty Headcount Ratio of India
Source: World Bank-World Development Indicators.

According to the database of poverty indicators from World Bank –World Development Indicators, India remained successful in reducing poverty from 39.9 percent in 2004 to 32.9 percent in 2009. The rate of poverty declined to 22.5 percent in 2011. In 2015, 18.7 percent of Indians were living in extreme poverty. In 2017, 13.4 percent of people were poor according to the poverty standard of $2.15 per person, per day (2017 PPP exchange rate). In 2019, the rate of poverty was reduced to 10 percent.

The focus of this study towards the ongoing discussion on the role of trade openness and rate of poverty in emerging economies (India). The remaining portion of the study has been organized as: Section two encompasses review of literature; third section covers the data sources and methodology of the study, empirical results and discussion are mentioned in fourth section and fifth section concludes the study followed by suggestions and related policy.

2. LITERATURE REVIEW

The literature review delivers evidence on the work done in the related area, and a theoretical and empirical framework of the present study. Kemal, *et al.*, (2000) investigated the linkages among trade liberalisation as well as the total rate of poverty in urban and rural areas. They estimated multivariable regression methods for the effect of another factor on the declining poverty rate. There will be a decline in the unemployment rate and will rise in real wages, which will lead to a drop in the poverty ratio. Trade policies will not only sufficient to reduce poverty but many economic policies are also required to get the benefits from trade liberalisation. Winters, Neil, and Andrew (2002) described the strategy of trade's impact on the state of poverty in emerging nations. In the long term, the openness of trade is extremely helpful to decrease poverty and there is now considerable evidence that it will normally raise the overall poverty rate. Trade reform also includes significant adjustments and several poor may be less well located in the short run to shield themselves against adverse effects and take advantage of good opportunities. Razzaque, A. *et al.*, (2003) examined an association between liberalisation and growth by some diverse measures such as trade liberalization (TO), ratio of GDP, and the share of imports of consumer commodities to GDP was created. The outcomes of approximation fail to expose any significant positive result of trade liberalisation indicators on development. Nath and Khawaja (2004) examined the connection among trade, economic development and inequality in wages. The empirical analysis recommends that there is numerous suggestion of trade openness (TO) accelerating development. Trade liberalization encourages investment. They found slight evidence of trade influencing income distribution and economic development is influenced by income distribution. Topalova (2007) analysed that in the theoretical aspect of the trade model through perfect factor mobility across districts, Labour will transfer in reaction to income and price shocks, aligning the occurrence of poverty across districts. In India, micro suggestion recommends that companies in production that were comparatively more liberalized experienced greater production in addition to productivity growth. Trade-encouraged production was increased maybe not shared with the workforce or was not enough to offset the comparative downward burden on factor returns. Hayashikawa (2009) examined that trade openness is essential for development of economy; eradication of poverty as well as aid for trade offers a framework for maximising the benefits of trade. This research has some practical steps to promote (aid for

trade to economic development and decline in poverty rate): it requires to be revealed that encouragement for trade is worth doing, benefits from trade contribute to broader development goals and aid for trade requires having distinguishable targets. Mojsiejuk and Ortsater (2009) examined the impact on poverty encouraged by trade through these models – economic development, prices and employment and income. The dynamics of the worker's market –encouraged by improvements from international trade- had contributed to optimistic rearrangements of employment. Lastly, a huge increase in real wages, made probable by production gains, had perhaps a maximum of all contributed to the solid decline in the poverty rate in the economy. Khan and Rashid (2010) analysed that development is an essential option for decreasing poverty in emerging economies. For the development as well as poverty, there occurs long-term relation development to poverty although for the short-term there is no significant relationship. The outcomes expressed that development of economy had an extensive effect on trade but in the case of poverty there are not any adequate results. It may be determined that trade openness had a major impact on growth (& vice versa) as well as growth reduces the poverty. Majeed (2011) explained the influence of trade liberalization on per capita income as well as Gross Domestic Product is irrelevant, although the symbol is positive. On the other hand, its effect is negative in the case of employment. Theories of trade predict that trade liberalisation is the probable source of economic development; it ensures a positive impact on the labour market. The connection between trade and employment comes out to be negative. Omolo (2011) explained the influence of TO on rate of poverty, domestic well-being is positive, although relatively lesser. It might suggest that trade openness is not alone enough to increase welfare but combinations of other policies that increase economic performance are also an essential component of guaranteeing that trade openness's outcomes in the declining poverty rate and development. Chaudhary and Imran (2013) analysed the time series regression that recommends trade openness declines rate of poverty but does not ensure having a major influence on overall poverty as well as wages disparity in the short-time period. For a long period, trade liberalisation had some strong effects on the rate of poverty and inequality. Maelam and Singh (2014) examined that trade openness is measured as an effective instrument to improve growth, theoretically as well as empirically, and its result on poverty was indistinct. Further trade openness outcomes in a decline in poverty when the monetary sector is deeper, and an improvement in the level of education. The benefits from trade are not automatic but also need effective policies to accompany trade openness. Rahim, *et al.,* (2014) explained through the discussion on the effect of globalization and development on the rate of poverty and income inequality had not been completely conflicting. It creates winners as well as losers among the poor. Whatever the methods and measurements are used, reduction in poverty via economic growth must become the ultimate aim of development endeavours towards a more peaceful, prosperous economic world. Mamoon (2015) analysed that may be trade convey an optimistic impact on the condition of the poor in emerging economies over development, but such improvements are not equally distributed between the higher class as well as the poor class. The analysis of this study recommended that an increase in the trade may be effective for rate of poor in the small period and welfare-altering effects that may obstruct the optimistic results in the long period of time as global trade does carry unsatisfactory effects. Mitra (2016) examined that economic development is essential, although not enough for the decline in the rate of poverty in emerging economies. Cross-country regression analysis, as well as single-country regression analysis, supports that trade openness will lead to a decline in poverty. China and India, the greatest example of the positive effects of trade liberalisation on poverty, experienced a huge decrease in the poverty rate. Madan (2017) described the significance of trade openness in decreasing poverty in India as well as determining that a durable performance in the global marketplace can support reducing local poverty in emerging economies. The researcher concluded that there is a durable relationship through the experimental analysis of the growth-increasing special effects on exports as well as overall trade. Saera and Lee (2018) explained the impact of trade openness which varies in rural as well as urban areas in emerging economies. In the case of local poverty, a rise in export contributes to a decline in the poverty rate both in rural and urban area's poverty. An increase in the quantity of export does not have an effect on domestic poverty except at the local level; a rise in export will further contribute to a decline in the rate of poverty in an urban area. In contrast, the outcome showed that a rise in import shares worsens domestic poverty and urban poverty. Adegbemi, Johson, and Ogundajo (2019) analysed the link between trade liberalization and poverty through various econometric tests. To check the rationality of the regression model some tests like autocorrelation, heteroscedasticity were conducted. The outcomes conclude that FDI and the rate of inflation had a direct association with the HDI while the rate of exchange and trade liberalisation was not directly related to the rate of poverty.

From the literature reviewed, it is established that in various economies the impact of trade openness on poverty remains unclear. This study main objective is to investigate the impact of trade openness on poverty as well as economic growth in India.

3. Data Sources and Model Specification

The main objective of this research is to analyse the link between trade openness (TO) and poverty in India. Data collected from different secondary sources and in Table 1 all the selected variables, related definition, data sources and their expected sign are as follows:

Table 1: Sources of selected variables

Variables	Definition	Data Source	Expected sign.
Dependent Variable			
HDI	Value of Human development index	United Nations Development Programme (UNDP)	+
Independent Variables			
TO *X* *M* *G.D.P*	{(Import+ Export) / GDP} Import as current currency Export as current currency G.D.P as current currency	World Development Indicators (WDIs)	+
FDI	Foreign direct investment as net inflows (% share of GDP)	WDIs	+
ER	Official exchange rate (LCU per US$, period average)	WDIs	+
IR	Inflation rate (as annual percentage of consumer prices)	WDIs	-
PGDP	GDP per capita (as annual percentage of growth)	WDIs	+

Source: Authors' computation

This research has used time series data from 1990 to 2020. Trade Openness (TO) drive through the addition of Imports (current currency) and Exports (current currency) and after that we will divide this addition by G.D.P (Gross Domestic Product) [Onakoya, *et al.*, (2019)]. HDI (Human Development Index) is used as a proxy variable for measuring poverty because the data of the multidimensional poverty index and poverty headcount ratio are not sufficient for time series analysis. All the feasible database of the poverty index mentioned above were looked upon, but the dataset is not sufficient *[Ahmad, et.al (2012), Fauzel, et.al (2016), Onakoya, et.al (2019) and Workneh (2020)]*. Other independent variables are based on the existing literature such as Foreign Direct Investment (FDI), Exchange Rate (ER), Inflation Rate (IR) and G.D.P per capita (PGDP). In table 1 summary of selected variables, data sources and their expected signs are explained.

The regression equation of the time series model is based on the study of Chaudhary and Imran (2013).

$$LHDI_t = \alpha_o + \alpha_1 LTRADEOP_t + \alpha_2 L\,FDI_t + \alpha_3 LEXRATE_t + \alpha_4 LIFR_t + \alpha_5 LPGDP_t + \in_t$$

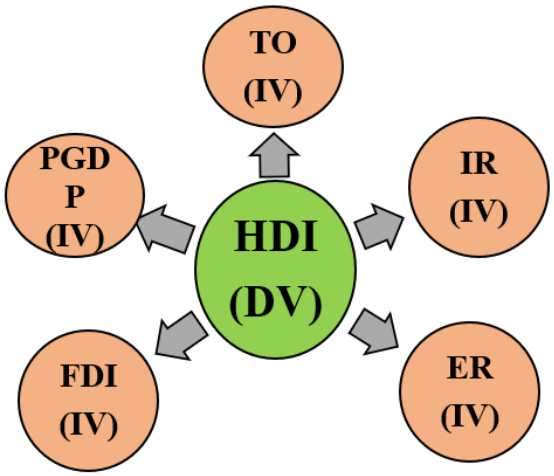

Figure 2: Shows variables [Dependent Variable- DV* and Independent Variable –IV*] used in this study

3.2 METHODOLOGY

The study is focused to analyse the linkage between trade openness and poverty. To fulfil the objectives, three step models— first stage is pre-estimation, second stage is estimation, and the last stage is post-estimation were used in the study. In pre-estimation stage, a descriptive statistic is used to analyse the nature of variables. The autocorrelation among the variables selected was investigated using the correlation matrix test. Unit root test was used to check the stationarity of the series. The series should be stationary

at level [I (0)] or first difference [I (1)] during the estimate phase. To find out both the long-run and short-run relationships between the variables, we may use the ARDL co-integration model. Prior to ARDL test bound test is employed to verify the presence of a long term as well as short term co-integration association among the variables before the ARDL co-integration model. The third stage (post-estimation) involves some tests to verify robustness. These include the autocorrelation test, heteroscedasticity tests, and the Ramsey RESET test, which examines for the possible omission of any significant variable that might have an impact on the model's dependent variable (HDI). The model's completeness will be explained, the model's residuals will fluctuate, and the non-linear combinations of the fitted values among the variables will be tested.

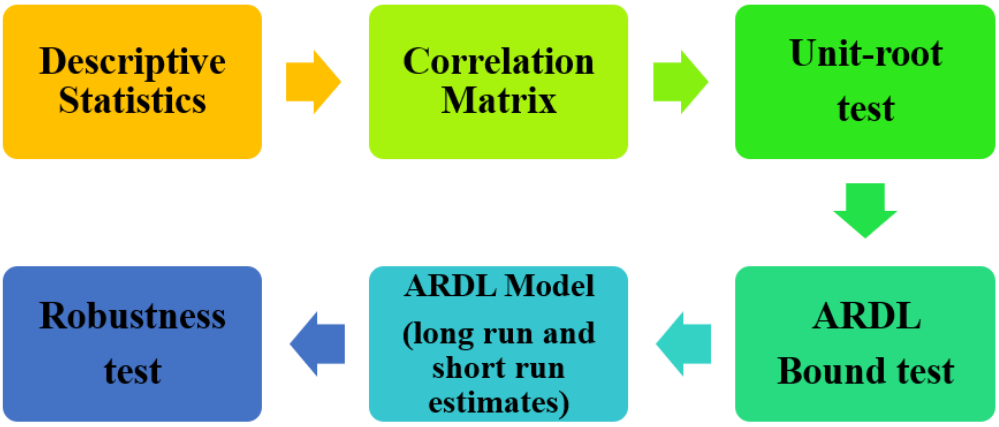

Figure 3: Methodology used in the study

4. RESULTS AND DISCUSSION

Table 2 shows the characteristics and the descriptive statistics of the variables.

Table 2: Results of Descriptive Statistics

	HDI	TO	FDI	ER	IR	PGDP
Mean	0.5390	0.3538	1.2539	3.2279	7.2677	4.6882
Median	0.5340	0.3780	1.0560	3.1320	6.6230	5.3020
Maximum	0.6450	0.5570	3.6200	5.1220	13.870	7.4840
Minimum	0.4340	0.1550	0.0270	1.2900	3.3280	1.0450
Std.Dev.	0.0719	0.1275	0.8626	0.9832	3.1683	1.8830
Skewness	0.1337	0.0213	0.6022	0.1256	0.4665	-0.3665
kurtosis	1.6377	1.6487	3.0168	2.4216	2.0027	1.8246

Source: *Authors computation*

There is a significant variance in the trend of the variables across the span of time as a result of the series' large disparity between its minimum and maximum values. All the selected variables are positively skewed but in case of PGDP the series is negatively skewed. Some of the variables are platykurtic in nature such as human development index, trade openness, exchange rate, inflation rate and G.D.P per capita and their values for kurtosis are 1.63, 1.64, 2.42, 2.0 and 1.82, therefore indicates a higher than normal distribution. Foreign direct investment's value is 3.01 which shows that it is leptokurtic in nature indicating a flatter than normal distribution. Table 3 demonstrates the outcomes of the correlation matrix.

Table 3: Results of Correlation Matrix

	LHDI	LTO	LFDI	LER	LIR	LPGDP
LHDI	1.0000					
LTO	0.8700	1.0000				
LFDI	0.7953	0.8552	1.0000			
LER	0.9116	0.7651	0.8344	1.0000		
LIR	-0.3534	-0.2018	-0.3323	-0.5210	1.0000	
LPGDP	0.4384	0.4107	0.4416	0.4354	-0.1446	1.0000

Source: *Authors computation*

The correlation matrix results in Table 3 show that 75–95% relationship between HDI, TO, FDI and ER which shows a high level of correlation between these variables. HDI has a 15–55% association with other variables such as PGDP which shows a moderate level of correlation between these variables. Conversely, HDI association with IR shows a negative correlation between these variables. Table 4 demonstrates the outcomes of the A.D.F. and P.P test at a level and at first difference.

Table 4: Results of Unit root tests: ADF and PP

Variables	ADF I(0)		ADF I(1)		PP I(0)		PP I(1)	
	t-value	p-value	t-value	p-value	t-value	p-value	t-value	p-value
with constant								
LHDI	-1.0794	0.7106	-4.0531	0.0040	-0.9469	0.7587	-4.3080	0.0021
LTO	-2.2750	0.1806	-4.3642	0.0018	-2.1570	0.2252	-4.4013	0.0016
LFDI	-2.1369	0.2324	-6.1852	0.0000	-2.9031	0.0658	-6.0354	0.0000
LER	-3.1906	0.0305	-4.4755	0.0013	-2.8062	0.0693	-4.4794	0.0013
LIR	-3.8470	0.0072	-6.4602	0.0000	-2.2520	0.1933	-6.4690	0.0000
LPGDP	-4.6100	0.0009	-5.8019	0.0000	-4.5890	0.0009	-15.9304	0.0000
with constant and intercept								
LHDI	-0.3604	0.9845	-4.1140	0.0156	-1.2335	0.8848	-4.3349	0.0094
LTO	-0.1239	0.9919	-5.1451	0.0013	-0.1239	0.9919	-5.1452	0.0013
LFDI	-2.1753	0.4853	-7.0040	0.0000	-1.8977	0.6307	-6.7906	0.0000
LER	-3.6378	0.0432	-4.4058	0.0080	-3.4171	0.0697	-4.3854	0.0083
LIR	-3.7343	0.0377	-6.3528	0.0000	-2.3304	0.4059	-6.3575	0.0000
LPGDP	-5.5417	0.0004	-5.7059	0.0003	-6.7501	0.0000	-23.5194	0.0000

Source: *Authors computation*

To check the stationarity of the selected variables the A.D.F. Test and P.P Test are used. The outcome of the A.D.F test shows that at the level[I(0)], some of the selected variables are stationary because the p-value of those variables are less than the 0.05 significance level of probability such as ER (0.0305), IR (0.0072) and PGDP (0.0009) and some of the selected variables are stationary at I(1) (first difference) as their p-value are higher than the 0.05 significance level of probability such as HDI (0.0040), TO (0.0018) and FDI (0.0000).The outcome of the P.P test shows that at the level[I(1)], some of the selected variables are stationary because the p-values of those variables are less than the 0.05 significance level of probability such as PGDP (0.0009) and some of the variables are stationary at first difference [I(1)] as their p-values are higher than the 0.05 significance level of probability such as HDI (0.0021), TO (0.0016), FDI (0.0000), ER (0.0013) and IR (0.0000). Due to the mixed order [stationary of some variables are at I (0) of some are at I(1)] of integration, the ARDL co-integration test can be employed to examine the short-term along with long-term associations among the selected variables. Table 5 demonstrates the outcomes of ARDL bound test.

Table 5: Results of ARDL bound test

LHDI=(LTO, LFDI, LER, LIR, LPGDP)				
Significance Level	**F-stat**	**k**	**I**(0)	**I**(1)
	12.88	**5**		
10%			2.08	3
5%			2.39	3.38
1%			3.06	4.15
Remarks: Co-integration				

Source: *Authors computation*

The results of the ARDL limits test indicate that the estimated F-statistics is greater than the upper bound value, which suggests that the selected variables may be correlated both in short-term along with long-term. Table 6 demonstrates the outcomes (long run & short run) based on ARDL test.

Table 6: Results of (Long & Short Period of time) based on ARDL Method

Dependent Variable: LHDI **Model: 2,2,2,2,2,2**				
Variables	**Coefficients**	**Std. Error**	**t-Statistics**	**Prob.**
Long run				
LTO	0.3323	0.0237	13.9890	0.0000
LFDI	-0.1061	0.0102	-10.3285	0.0000
LER	0.1896	0.0503	3.7654	0.0031
LIR	0.0041	0.0206	0.2012	0.8442
LPGDP	-0.0463	0.0152	3.0377	0.0113
C	-0.4361	0.1075	-4.0567	0.0019
Short run				
LHDI(-1)	-0.4920	0.1826	-2.6933	0.0002
LTO(-1)	0.0783	0.0131	5.9501	0.0001
LFDI(-1)	-0.0250	0.0057	-4.3547	0.0011
D(LER(-1))	-0.1228	0.0336	-3.6514	0.0038
D(LIR(-1))	0.0059	0.0046	1.2714	0.2298
D(LPGDP(-1))	-0.0098	0.0035	-2.7838	0.0178
CointEq(-1) *	-0.2356	0.0199	-11.8062	0.0000

Source: *Authors computation*

According to results shown in above table, there is a long-term positive association between HDI and trade openness, exchange rate in India. Conversely, in long run there is a negative link among HDI and FDI, G.D.P per capita. Consequently, the effect of inflation rate is insignificant. The results of short-run coefficients show that effect of trade openness have a positive and statistically significant (at a significant level 5%) impact on HDI in the short term. Conversely, FDI, exchange rate, G.D.P per capita have a negative impact on HDI and the effect of inflation rate is insignificant.

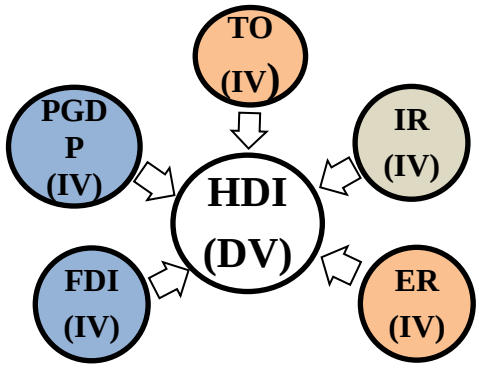

Figure 4: Represents the summary of HDI's long-term outcomes.
Note: Green, Blue, Grey colors specify positive, negative and insignificant or no impact.

Table 7 demonstrates the outcomes of robustness test.

Table: 7 Results of Robustness Tests

Breusch-Godfrey Serial Correlation LM Test			
F-stats.	13.0182	P-value	0.0001
Obs*R-square	16.4598	P-value	0.0002
Heteroskedasticity (White) Test			
F-stats.	7.3608	P-value	0.0012
R-square	29.0281	P-value	0.0872
Ramsey RESET Test			
F-stats.	40.6671	P-value	0.0000
Log likelihood ratio	30.7271	P-value	0.0000

Source: *Authors computation*

The results of Breusch Godfrey Serial Correlation LM test clearly state that there is presence of autocorrelation in the model as the value (probability) of F-statistic are less than 1% significance level. The outcomes of White Heteroskasticity test demonstrate that value (probability) of F-statistic is less than 1% significance level which shows the presence of heteroskadasticity in the regression model. Ramsey's RESET test confirm that the possibility of influence of independent variables (TO, FDI, ER, IR, and PGDP) could have effect on the dependent variable (HDI) because P-value is 0.0000 which reveals that there is some significant variables is not taken in this study that can impact on human development index (HDI).

5. CONCLUSION AND SUGGESTIONS

This research paper is focused on the empirical analysis of impact of trade openness on poverty in India. Three step models: first stage is pre-estimation, second stage is estimation, and the last stage is post-estimation were used in the study. A descriptive statistics is used to analyse the nature of variables. By the correlation matrix the autocorrelation among the variables selected was investigated. Both ADF Unit root and PP Unit root tests was used to check the stationarity of the series. All the selected variables in the model are stationary at level or first difference during the estimate phase. To find out that there is a short- or long-term connection among the selected variables, if the series are stationary at the mixed level (some are stationary at level of some are stationary at first difference). Further ARDL co-integration model to find short as well as long-term associations among the selected variables, we may use the. ARDL bound test is used to verify the presence of a co-integration association among the selected variables before the ARDL co-integration model. Some post-estimation tests run to verify the validity and robustness of the regression model results. These tests include the autocorrelation, heteroscedasticity, and Ramsey RESET tests. Correlation matrix's results shows that there is highly positive correlation among trade openness and poverty. Inflation rate (IR) is negatively associated with all the other independent as well as dependent variable. Results of regression analysis recommends that trade openness decreases poverty but in short run impact on poverty is not statistically significant due to some variables such as exchange rate (ER), inflation rate (IR) and G.D.P per capita (PGDP) and in comparison to short term as well as long term impact of trade openness (TO) on has strong effect. The results of the study's analysis of the impact of inflation rate on poverty reduction indicate to the need to maintain inflation under control in order to sustain the beneficial benefits of trade openness on poverty reduction and general economic stability. The results also highlight that trade policy should encourage labor-intensive industries; promote opportunities for productive work, and enable underprivileged people to participate in and gain from economic progress. The findings imply that policies need to adopt for expanding TO (Trade Openness), luring FDI (Foreign Direct Investment) and upholding a favorable ER (Exchange Rate) can support economic growth which will help in reduction of poverty.

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