Bound Test Co-Integration Approach to The Analysis of Relationships Between Gender Inequality & Sustainable Development in India

Dr. Bhawna Rajput[1], Dr. Anupama Rajput[2]

[1.]Associate Professor, Department of Commerce, Aditi Mahavidyalaya, University of Delhi ,
[2]Associate Professor, Department of Commerce, Janki Devi Memorial College, University of Delhi

Abstract

This paper attempts to analyze short term and long term effects of gender inequality on economic performance and human development of India using annual time series data for the period of 2000-2017. The study employed Auto-Regressive Distributed Lag (ARDL) model with GDP per Capita and Human Development Index (HDI) as a proxy for sustainable as dependent variable and composite Gender Inequality Index, investment and trade openness as independent variables. The empirical results show significantly negative impact of the gender inequality on sustainable economic growth and human well-being of India in the short run as well as long run. Thus gender equality is not merely an issue of social relevance but also an economic necessity.

Keywords: *Economic Performance, Human Development Index, Auto Regressive Distributed Lag, Gender Inequality.*

1. INTRODUCTION

Gender equality refers to the equality of power and opportunities for independence, education and personal development that equal power and equal opportunities exists for both men and women with respect to financial independence, education, and personal development. Gender equality stimulates economic growth, which is crucial for the developing nations like India. Women's empowerment is a pre-requisite for Gender equality. It involves the improvement of woman's self-worth, decision-making power and access to opportunities and resources. There exists a considerable degree of gender inequality in education, employment, and health outcomes. Gender inequality has adverse impacts on a number of valuable development goals. "Gender equality is not merely an issue of human rights, but an economic necessity. Worldwide, productivity growth and the pace of human development are slowing (ILO, 2017)". Blackden et al. (2006) states that the "gender inequality will have a direct impact on growth through its impact on development of institutional, physical, human and technological assets".

Gender inequality in employment also produces gaps in human asset development; therefore, has a negative impact on sustainable economic growth. The impact of gender inequality on sustainable development can work through several channels including demographic factors, education, and access to jobs and productive resources. Gender gaps in education imply that society`s human capital is below its potential. Reducing these gaps and addressing exclusion would thus potentially enhance growth.

Klasen (2016) "found that gender equality in education had a significant and positive impact, in a sample of 109 countries with data between 1960 and 1992. The studies have shown that women equality in the level of education, health, economic resources, and political representation is positively associated with higher economic growth. The education's impact on growth can be through reduced fertility (and vice versa), as this can impact women labour force participation, and dependency ratios". The World Bank's Role of Education Quality and Economic Growth, finds that for every year of schooling, economic growth is boosted by 0.58 percent. "Improved health and nutrition can positively impact the quality of the labour force (as well as reducing fertility). Women's increased bargaining power within the household has been associated with a range of positive development outcomes, which in turn can have a positive impact on growth" (Roncolato et al. 2017). The decision-making include control of income and

assets, age at marriage and level of education. A woman's empowerment within the household increases the likelihood of education for the children particularly girls and reduction of underweight children.

Mitra, Bang, and Biswas (2015) report "that that greater presence of women in legislative bodies may alter the composition of public expenditure in favor of health and education, which can raise growth over the medium to long run". The gender inequality in labor force participation with exclusion of women from the labor market can reduce the productivity levels of total labor force of an economy especially if the productive female workers are substituted male of relatively lower productivity levels. The occupational discrimination of women in the managerial position and labor market in general results in lower entrepreneurial talent and so has negative impact on the innovation and technological development. Thus, the inclusive growth policies with emphasis on gender equality can promote greater innovative and entrepreneurial activities and thus offers potential gain for economic growth and human well-being. IFC report (2013) finds that is makes good business sense to allow gender diversity in the company. It improves team performance, decision making processes and reduce staff turnover. It provides better consumers preferences insights as women influence most buying decisions.

The present study aims to provide empirical evidence to the gendered effects on sustainable development measured through proxy for economic growth and human well-being of the country. Specifically, the paper analyzes the impact of gender inequality on economic growth and human development of India. The paper is organized as follows. Section 2 provides literature survey Section 3 describes the theoretical model and data and methodology; Section 4 presents the empirical results and, finally, Section 5 concludes.

2. LITERATURE SURVEY

The relationship between gender inequality, human development and economic performance has been a topic of increasing interest in the academic and policy literature in recent decades. A number of theoretical and empirical studies have examined the relationship between gender inequality and economic growth. Bloom & Williamson (1998), Dollar & Gatti (1999), Galor & Weil (1996), King, Klasen & Porter (2008), Knowles et al (2002), Lagerlof (2003) and World Bank (2001) have found negative relationship between gender inequality in education and economic growth, largely due to the positive impact of female education on fertility and human capital of the next generation. "Gender inequality in education adversely affects economic growth, as it reduces the average quota of human capital in a society by excluding qualified girls and including less qualified boys" (Dollar & Gatti 1999). "Education inequality affects the average quality of human capital and reduces growth" (Klasen 1999). Klasen and Lamanna "investigates the effect of gender wage gap on economic growth in a cross country analysis for the time period 1960-2000. The results indicate that gender employment gap is one of the major determinants of growth differentials across countries". Mitra, Bang, and Biswas (2015) investigated the effects of gender equality on economic performance of the country by applying unbalanced panel regression analysis. The multidimensional nature of different aspects of the gender equality was analyzed so as to identify the relative significance of different aspects of equality. The gender inequality in economic opportunities and economic and political outcomes were found to be predominant. An improvement in equality on economic opportunity and political participation has significantly positive effects on the economic growth. The intensity of the impact was found to be dependent upon the stage of development of the country. In case of developing nations, the equality in economic opportunity leads to significant improvements in the growth and the developed economies greater equality in political participation enables significant improvements in the economic performance. Zahid Pervaiz, etal. 2010 analyzed the annual time series data for during 1972-2009 of Pakistan to investigate the impact of gender inequality on economic growth. The employment factors such as labor force growth and openness of trade were found to have significantly positive impact and gender inequality depicts the negative and significant impact on economic growth of the country. The level of Women's education was found to enable the children's health improvements, labor force participation growth rate and fall in the fertility rates leading to improved quality of human capital. Kingdon (1998) found that "due to overall labor market discrimination, girls face poorer economic incentives to invest in schooling than boys". Esteve-Volart (2004) found that the favorable female-to-male managers' ratio and the female-to-male workers ratios have positive and significant impact on the per capita output in 16 major states of India. Arora (2012) found that the unequal opportunities for women in education and health have negative impact on the per capita income of the states in India. Rammohan & Vu (2017) reported that the economic development leads to the narrowing down of gender gaps in education. The richer districts were found to have better female education levels than poorer districts of the country. The positive correlation between growth of per capita income and initial level of female school attainment was depicted by Barro and Lee (2013). Baliamoune-Lutz and McGillivray (2007) depicted the positive

and significant impact of human capital improvements on economic growth and gender inequality in education has significant negative impact on the economic growth in 41 SSA and Arab countries. Galor and Weil (1996) showed the high fertility rate and low economic growth have been caused by gender gap in education and earnings.

3. THEORETICAL MODEL FOR EMPIRICAL ANALYSIS

Though there are several studies investigating the relationship between gender inequalities and growth/ development in the context of developed economies, there are few studies available in the scholarly literature examining this aspect of gender inequality in India. This study contributes significantly to existing literature by evaluating the trends in the magnitude of gender inequalities in India and its impact on sustainable development of the country. This paper aims to determine the relationship between gender inequality and inclusive growth in India in order to determine the effects of reduction of women's inequality on inclusive sustainable growth for the sample period 2000-2017. Human well –being is an important indicator of the inclusive sustainable growth of any country. The traditional measure of nation's well being is the economic well-being generally measured by GDP per capita (GDPPC) and as alternative measures Human Development Index (HDI) created by the United Nations (UN) Development are taken as dependent variables to proxy the sustainable inclusive growth. The Gender inequality is captured by composite Gender Inequality Index (GII) for which the estimates are sourced from UN Human Development Report.

The long run and short run relationship between inclusive growth and GII are estimated using the specification given by Klasen and Lamanna as follows:

$$\ln GDPPC_t = \alpha_0 + \alpha_1 \ln GCF_t + \alpha_2 \ln GII_t + \alpha_3 Trade + \varepsilon_t \quad \text{(Model 1)}$$

$$\ln HDI_t = \alpha_0 + \alpha_1 \ln GCF_t + \alpha_2 \ln GII_t + \alpha_3 Trade + \varepsilon_t \quad \text{(Model 2)} \qquad (1)$$

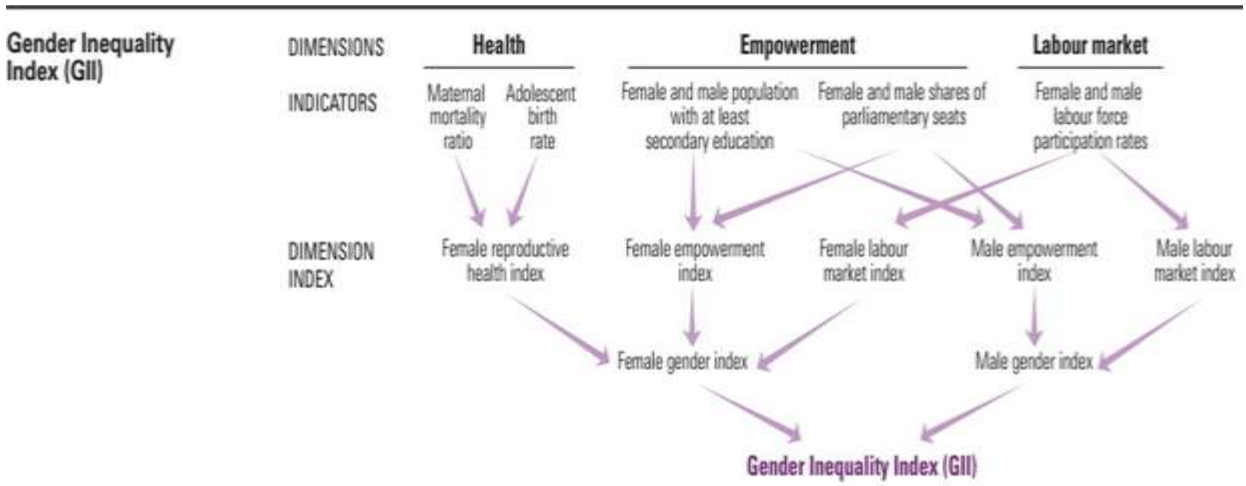
Where GDPPCt is real GDP per capita for the period t. GFCt is gross capital formation for period t; Trade denotes the trade to GDP ratio; GII is the Gender Inequality Index and HDI is the Human development Index of India in Model 2. Growth of gross capital formation at constant price (GCF) is used as a proxy for physical capital, Trade as a measure of openness in the economy is measured by total trade, exports plus imports, as a percentage of GDP. GII is the gender inequality index.

3.1 Definition of Variables and Data Sources

The GII estimates reflect the gender-based disadvantage in three dimensions—reproductive health, empowerment and the labor market (Figure 1). "The value ranges from 0 where women and men fare equally to 1, where one gender fares as poorly as possible in all measured dimensions. The GII is computed using the association-sensitive inequality measure suggested by Seth (2009), which implies that the index is based on the general mean of general means of different Orders—the first aggregation is by a geometric mean across dimensions; these means, calculated separately for women and men, are then aggregated using a harmonic mean across genders (UN HDI, 2017)".The measures of reproductive health are Maternal mortality ratio (MMR), and adolescent birth rate (ABR). The share of parliamentary seats held by male and female (PR) measure the empowerment and labor market conditions are measured by population with at least some secondary education (SE) and Labor force Participation rate (LFPR). The MMR estimates are maternal mortality per100, 000 live births, ABR shows the births per 1000 women in the age group of 15-19. PR is the proportion of seats held by men and women in national parliaments. ILO estimates of LFPR for ages of 15-24 years are used. SE shows the gross enrolment ratio at secondary level for males and females.

The Gender Inequality Index (GII) "shows the loss in potential human development due to inequality between female and male achievements in these dimensions. It ranges from 0, where women and men fare equally, to 1, where one gender fares as poorly as possible in all measured dimensions"(UNDP- HDI indices, 2015).

Figure 1: Gender Inequality Index Dimensions & Indicators—Graphical Presentation



Source: UNDP-HDI Indices and Indicators: 2017 Statistical Updates

This paper is based on secondary sources which were accumulated from the data base of World Development Indicators provided by World Bank, from a number of research papers, articles, books, NGO reports, regional organization brief reports, and government reports. The research tool and technique used in this study is secondary data analysis.

3.2 Estimation Procedure

The study estimates the relationship between GII and economic growth and Human Development using the sample period of 2000-2017. The ARDL model is used to estimate the given specification of equations of Model 1 and Model 2 stated earlier. There are several advantages in employing an ARDL model of estimation. The first advantage is that the model gives valid results without imposing any restriction on the order of integration of variables used in the study. It could be integrated of order zero, one or a combination of both. In other words, other co integration test requires all the variables of the same order of integration. ARDL model can determine the presence of a relationship in the long run even when the variables have a different order of integration. Secondly, "the ARDL model is suitable for this research as it performs better when estimating small sample sizes compared to other co integration tests" (Pesaran, M.H.; Shin, Y,1999). As the first step, Augmented Dickey-Fuller (ADF) (1981) unit root test is performed to investigate the presence of the stationarity in the time-series data of variables. The optimum lag length is required to be selected since the ARDL model presupposes no serial correlation in errors. The optimum lag length is selected on the basis of information criteria such as AIC (Akaike Information Criterion), SC (Schwarz Information Criterion), HQ (Hannan-Quinn Information Criterion), FPE (Final Prediction Error) and LR (Sequential Modified LR Test Statistic).The ARDL bound test for co-integration is conducted to determine the long-run relationship between the variables. For this purpose the following equations for two models are estimated.

$$\Delta \ln GDPPC_t = \alpha_0 + \sum_{i=1}^{n} b_i \Delta \ln GDPPC_{t-i} \sum_{i=0}^{n} c_i \Delta GCF_{t-i} + \sum_{i=0}^{n} d_i \Delta \ln GII_{t-i} + \sum_{i=0}^{n} e_i \Delta Trade_{t-i} + \lambda_1 \Delta \ln GDPPC_{t-1} + \lambda_2 \Delta GCF_{t-1} + \lambda_3 \Delta \ln GII_{t-1} + \lambda_4 \Delta Trade_{t-1} + \mu_t \quad (2)$$

Where Δ shows the first difference of the variables and μt is an error term which random and serially independent with mean of zero mean and finite covariance matrix, and α_0 denotes the constant which is the deterministic term. F-test is conducted to investigate the existence of the relationship in the long run (i.e. presence of co-integration) amongst variables of the study. The test procedure determines the significance of the coefficients of the lagged levels of the variables taken together. The rejection of null hypothesis reflects the presence of co integration and

long term association amongst the variables. Pesaran et al. (2001) provided a set of asymptotic critical values. These critical values can be used regardless of the integration order of the variables. Two types of critical values are available one is Lower Bounds I(0) and second is Upper Bound I(1) If the calculated value of F-statistic is higher than the upper bound critical value, the null hypothesis of no cointegration between variables can be rejected. If the F-statistic falls below the lower bound critical value, the null hypothesis of no long-run relationship cannot be rejected. However, if the value of F-statistic falls within the lower and upper critical bounds, the result of co integration will be inconclusive.

The confirmation of the existence of long run co integration is followed by the estimation of the long run ARDL models and error correction models (ECM). The long-run coefficients are derived from ARDL equation and short-run coefficients are given by ECM. The long run relationship amongst variables is estimated using the following equation.

$$\Delta \ln GDPPC_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \ln GDPPC_{t-i} + \sum_{i=0}^{q} \alpha_2 \ln GCF_{t-i} + \sum_{i=0}^{r} \alpha_3 \ln GII_{t-i} + \sum_{i=0}^{s} \alpha_4 \ln Trade_{t-i} + \mu_t \quad (3)$$

The above equation is transformed to accommodate the one period lagged error correction term (ECTt–1) and the short term coefficients are estimated.

$$\Delta \ln GDPPC_t = \alpha_0 + \sum_{t=1}^{n-1} \alpha_1 \Delta \ln GDPPC_{t-i} + \sum_{t=0}^{n-1} \alpha_2 \Delta \ln GCF_{t-i} + \sum_{t=0}^{n-1} \alpha_3 \Delta \ln GII_{t-i} + \sum_{t=0}^{n-1} \alpha_4 \Delta \ln Trade_{t-i} + \alpha_5 EC_{t-1} + \mu_t \quad (4)$$

Where are α_1 α_2 α_3 and α_4 are short run coefficients, while EC is the error correction term that shows the speed with which the system achieve the long run equilibrium after a shock in the short run i.e. convergence towards equilibrium position in case of any disequilibrium situation.

The serial correlation, normality and heteroscedasticity are examined by diagnostic tests on estimated regression. LM and F-test are conducted to check serial correlation and heteroscedasticity. Jarque –Bera test is performed to check normality. The stability of the model is tested using the cumulative residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) to the residuals of the error-correction model.

4. EMPIRICAL RESULTS

The statistical measures of average i.e. Mean and Median and maximum and minimum values are estimated for log of each variable. The measure of dispersion of the variable i.e Standard Deviation is calculated. The structure of the distribution of variables is evaluated using Skewness, Kurtosis, Jarque-Bera and Probability values of the estimated model. The volatilities in the data are also depicted by Skewness and Kurtosis. The summary statistics providing the description of variables are presented in Table-1.

Table 1: Descriptive Statistics for the Variables (2000-2017)

	InGDPPC	InGCF	InGII	InTRADE	InHDI
Mean	11.03064	3.204201	-0.52694	3.729108	-0.56711
Median	11.01741	3.224572	-0.52824	3.779754	-0.56565
Maximum	11.49736	3.856275	-0.43699	4.021661	-0.44161
Minimum	10.62012	2.484087	-0.64028	3.257837	-0.69917
Standard Deviation	0.278241	0.376978	0.060758	0.244851	0.082942
Skewness	0.074433	-0.51776	-0.32854	-0.6854	-0.08543

Kurtosis	1.835168	2.635071	2.090675	2.309192	1.80816
Jarque-Bera	1.034246	0.904112	0.94396	1.767227	1.087256
Probability	0.596233	0.636319	0.623766	0.413287	0.580638
N	18	18	18	18	18

Source: Author's own Compilation

The estimated results of Jarque-Bera test show that the variables are normally distributed as the p-value of test is higher than the conventional value of 0.05 for all variables. Figure 2 shows the trends of GII of India for the sample period 2000-2017. The GII estimates are based on three dimensions viz. reproductive health, empowerment and the labor market. There is a consistent improvement of status of gender equality in India. Various policies and schemes for the reduction of gender inequality have been initiated by the state and the central Government of India. The measures mainly aim to boost women's empowerment in India. However the gender gap is still significant in India. According to the Global Gender Gap Report (2017) "India ranks 108 amongst 144 countries. India's gender gap index is far below the global average and much below its neighbors such as Bangladesh which is ranked 47 and china which achieved 100th position in the ranking. The wide gender gap exists mainly in the economic participation and opportunities for women in India".

Source: Author's Own Compilation based on UN HDI Reports of different years.

Table-2 presents the correlation matrix among variables. HDI as a measure of inclusive growth is significantly positively correlated with trade and GDP per capita. There is a negative and significant correlation between gender inequality and GDP per capita and HDI. Overall the correlation matrix shows the gender inequality has a strong correlation with economic growth and human well being.

Table 2: Correlation Matrix (2000-2017)

	InGDPPC	**InHDI**	**InGII**	**InTrade**	**InGCF**
InGDPC	**1**				
InHDI	0.9973*	**1**			
InGII	-0.9172*	-0.8980*	**1**		
InTrade	0.6468*	0.6895*	-0.4304	**1**	
InGCF	-0.0894	-0.0832	0.2797	-0.035	**1**

Source: Author's own Compilation * significant at 5% level of significance.

Table 3 depicts the unit test results based on the Augmented Dickey-Fuller (ADF) Test. The test results indicate that all variables except GCF are found to have the presence of unit root at their level. However, all times-series reject

the unit root hypothesis and become stationary at their first difference level at 5% level of significance. The variables in the study are not of the same order of integration rather combination of the order of I(0) and I(1). Thus it justifies the ARDL model for estimation purposes.

Table 3: Results of the Stationarity Test: The ADF Test (2000-2017)

Variables	Level	First Difference
InGDPPC	1.439942	-3.36348**
InGCF	-3.93585***	-3.95936***
InGII	0.207127	-18.1965***
InTrade	-1.93329	-3.16768**
InHDI	-0.80726	-3.95329***

Note: (*), (**), (***) indicate that the coefficient is significant level at 10%, 5%, 1%, respectively E-VIEWS output generated the values. Source: Author's Own compilation.

The results of ARDL bound test for co integration are reported in Table-4. The estimated values of F-statistics for both models are higher than the upper bound value at 1 percent level of significance. Thus, the null hypothesis of no long run relationship (i.e. co-integration) is rejected and it confirms the presence of co-integration among the variables of both the models. The optimal lag length based on various test for both the models is one.

Table 4: ARDL Bound Test Results for Co integration with intercept and no Trend (2000-2017)

Critical bound values based on F-statistics							
	k	**90% level**		**95% level**		**99% level**	
		Lower	Upper	Lower	Upper	Lower	Upper
	3	*2.37*	*3.2*	*2.79*	*3.67*	*3.65*	*4.66*
Model	**Optimal Length**		**F-Statistics**			**Results**	
Model 1	1		163.98***			Co integrated	
Model 2	1		49.54919***			Co integrated	

Note:. (*), (**), (***) indicate that the coefficient is significant level at 10%, 5%, 1%, respectively K shows the number of regressors. These values are generated by E-VIEWS output. Source: Author's own compilation.

The evidence of presence of co integration allows for the estimation of long run coefficients of ARDL model are presented in Table-5.

The results show that gender inequality has a negative and significant impact on economic growth as measure by GDPPC and human well being as measure by HDI of India. Thus, overall the reduction in the gender inequality has positive contribution towards sustainable development. The coefficient of GII is negative and significant in both the models. The results are consistent with study of Ward et al. (2010) that show that by improving gender equality, countries can improve economic performance.

Table 5: Long-run Estimates of ARDL Model (2000-2017)

ARDL Model 1 (1, 1, 1, 1)		**ARDL Model 2 (1, 0, 0, 0)**	
Dependent Variable: Δ InGDP$_t$		**Dependent Variable: Δ InHDI$_t$**	
InGCF$_t$	0.134724* (2.093297)	**InGCF$_t$**	0.007417 (0.643523)
InGII$_t$	-4.21251*** (-25.920717)	**InGII$_t$**	-1.100816*** (-22.110181)
InTrade$_t$	0.170221*** (5.999055)	**InTrade$_t$**	0.07124*** (4.9441)

C	7.862729*** (32.337111)	C	-1.405915*** (-23.961443)

Note: Note: t-statistics values are given in parentheses, while (*), (**), (***) indicate that the coefficient is significant level at 10%, 5%, 1%, respectively. Source: Author's own compilation.

Seguino (2000) concludes that gender inequality has a positive relationship with economic growth; the more inequality there is, the better growth outcomes arise. Klasen found that "gender equality in education had a significant and positive impact, in a sample of 109 countries with data between 1960 and 1992". A 1% increase in the gender equality will increase the economic growth by 4.1% (model 1) and human well being or inclusive growth by 1.1% (Model 2). The trade is found to be positively and significantly associated with economic growth and human development. A one percent increase in trade will bring about 0.17 and 0.17 percent improvement in the GDP per capita and human development index of the country. This indicates that in the long run trade openness stimulated economic growth and also improves human well-being and sustainable development in the nation. The coefficient of gross capital formation is positive though insignificant at 5% level of significance.

Table 6: Error correction representations for ARDL Model According to AIC (2000-2017)

ARDL Model 1 (1, 1, 1, 1)		**ARDL Model 2 (1, 0, 0, 0)**	
Dependent Variable: Δ InGDP$_{t-1}$		**Dependent Variable: Δ InHDI$_{t-1}$**	
Δ **InGCF$_{t-1}$**	0.026929*** (4.180843)	Δ **InGCF$_{t-1}$**	0.00281 (0.00322)
Δ In**GII$_{t-1}$**	-1.312329** (-2.713713)	Δ In**GII$_{t-1}$**	-0.417111 (0.287872)
Δ In**TRADE$_{t-1}$**	-0.027774 (-0.685887)	Δ In**TRADE$_{t-1}$**	0.026994 (0.01624)
ECMt-$_1$	-0.363373** (-2.580539)	**ECMt-$_1$**	-0.378911*** (0.254212)

Note: t-statistics values are given in parentheses, (*), (**), (***) indicate that the coefficient is significant level at 10%, 5%, 1%, respectively Source: Author's own compilation

The error correction term (ECT) is significant and negative at 1% level of significance in Table 6 which further proves the existence of stable long run relationship among variables of the study.

In model 1 it means that it will take (1/ -0.36337) =2.75 years to reach to equilibrium again following a shock in the regressors. In model 2 it will take (1/ -0.37891) = 2.6 years to reach to equilibrium. The short run results also quite similar to the long-run estimates. The short run coefficient of GII is also negative and significant. Thus, the gender inequality has an adverse impact on economic and sustainable development of the country in the short run also.

The long run and short run results support the positive impact of gender equality on economic growth and overall human wellbeing. The Sustainable Development Goals adopted in 2015 has correctly include the aim to "achieve gender equality and empower all women and girls" for achieving sustainable development of the country. It is found to have multiplier effects for all development areas. It is not only a basic human right but promotion of gender equality is recognized as a central theme of poverty reduction and development policy, and even for sustainable development effectiveness. Thus, equal opportunity for women in access to economic resources, health services and political positions are vital for achieving gender equality.

The test results of diagnostic test (Table 7&8) shows that there is no serial correlation among the variables of both the models.

Table 7: ARDL Model Diagnostic Tests (Model 1)

Test	LM Test	F Test
A: Serial Correlation	χ^2 (1)= 2.373953(0.1234)	F(1,8)= 1.298479(0.2875)
B: Normality	Jarque-Bera = 1.377974(0.502085)	
C: Heteroscedasticity	CHSQ(7) = 3.472097(0.8382)	F(7,9)= 0.329994(0.9211)

Note: (*), (**), (***) indicate that the coefficient is significant level at 10%, 5%, 1%, respectively
Source: own compilation Source: Author's Own Compilation

Table 8: ARDL Model Diagnostic Test (Model 2)

Test Statistics	LM Version	F Version
A: Serial Correlation	χ^2 (2)= 1.581029(0.4536)	F(2,10))= 0.512689(0.6138)
B: :Normality	Jarque-Bera = 0.068511(0.966324)	
C: Heteroscedasticity	CHSQ(4) = 5.734624(0.2199)	F(4,12)= 1.527146(0.2561)

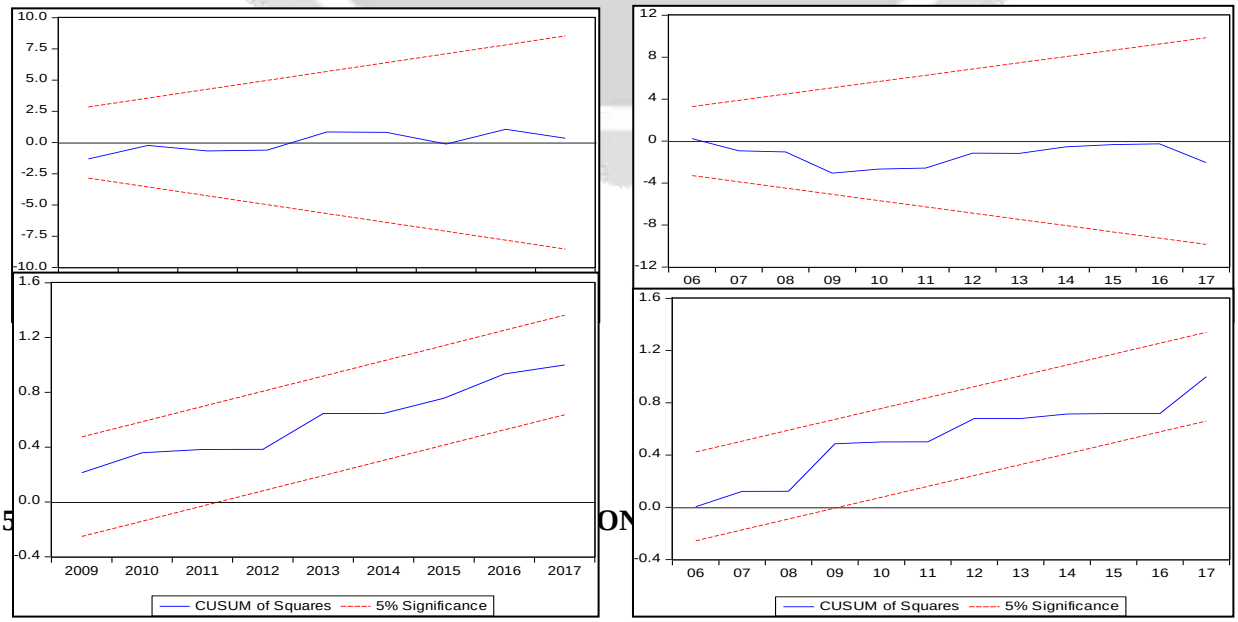
Note:, (*), (**), (***) indicate that the coefficient is significant level at 10%, 5%, 1%, respectively. Source: Author's own compilation.

The Jarque-Bera test suggests the presence of normality amongst the variables. The results show that there is no heteroscedasticity in data for both the models. The stability of the long run and short run coefficients are examined using Cumulative Sum (CUSUM) and the Cumulative Sum of the Squares (CUSUM sq) tests. The charts of Cumulative Sum (CUSUM) and the Cumulative Sum of the Squares (CUSUM sq) tests are reported in Figure 3.

The figures shows that Cumulative Sum (CUSUM) and the Cumulative Sum of the Squares (CUSUM sq) are between the two critical lines and do not go outside the critical boundaries and thus both the models are correctly specified.

Figure 3: Results of the Stability Test for all Models

Model 1 Model 2



The study aims to identify the long run and short run impact of gender equality on sustainable development measured through GDP per capita and human development index of India for the period of 2000-2017 using ARDL model. The study used the comprehensive gender inequality index as a proxy to measure gender inequality. The empirical results provide strong evidence that gender inequality has negative impact on economic growth and human well being. Women empowerment plays an important role to bring sustainable inclusive growth in the country. Thus the issue of gender inequality should be addressed not just for equity reason but it also has significant economic and sustainability relevance. The Government policy should ensure equal opportunities for women in term of access to resources, healthcare services, education, banking, sanitation, safe drinking water, electricity etc. Policy and legislations can go a long way to creating enabling environments for women to eliminate gender discrimination. The public private participation is needed to close the gender gap through widening of access to public services without gender discrimination. Societal attitudinal transformation can improve the women's access to opportunities and resources and swiftly bring progress towards gender equality.

6. REFERENCES

- **Arora (2012).** "Gender inequality, economic development, and globalization: A state level analysis of India". *The Journal of Developing Areas*. 46 (1): 147–164.
- **Baliamoune-Lutz, M. and McGillivray, M. (2007)** Gender Inequality and Growth in SubSaharan Africa and Arab Countries, ICER Working Papers 25-2007, Turin: International Centre for Economic Research (ICER).
- **Barro, R.J. and J.W. Lee, 2001**, International Data on Educational Attainment: Updates and Implications Oxford Economic Papers, 53(3): 541-563.
- **Barro RJ, Lee JW (2013)** A new data set of educational attainment in the world, 1950–2010. J Dev Econ 104:184–198
- **Blackden, M; Canagarajah, S; Klasen, S. & Lawson, D. (2006).** Gender and Growth in SubSaharan Africa: Issues and evidence. Research Paper, UNU-WIDER, United Nations University (UNU), No 2006/37. http://hdl.handle.net/10419/63512
- **Bloom, David E. and Jeffrey G. Williamson. (1998).** ''Demographic Transition and Economic Miracles in Emerging Asia.'' World Bank Economic Review 12(3): 419–55.
- **Chani, M. I., Pervaiz, Z & Chaudhary, A. R., 2011**. Determination of Import Demand in Pakistan: The Role of Expenditure Components, Theoretical and Applied Economics, 18(8), 93-110.
- **Dickey, D. and W. Fuller (1981).** "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," Econometrica, 49, 1057-1072.
- **Dollar, David and Roberta Gatti. 1999. ''**Gender Inequality, Income and Growth: Are Good Times Good for Women?'' Mimeograph, World Bank, Washington, DC.
- **Esteve-Volart, B.** "Gender Discrimination and Growth: Theory and Evidence from India", 2004,London, London School of Economics and Political Science.
- **Frisch Centennial Symposium; Strøm, S.,Ed.;** Cambridge University Press: Cambridge, UK, 1999; pp. 371–413.
- **Galor, Oded and David N. Weil**. 1996. ''The Gender Gap, Fertility, and Growth.'' American Economic Review 86(3): 374–87**.**
- **International Finance Corporation. 2013.** Investing in Women's Employment: Good for Business, Good for Development. Available at: http://www.ifc.org/wps/wcm/connect/5f6e5580416b b016bfb1bf9e78015671/InvestinginWomensEmployment. pdf?MOD=AJPERES.
- **International Labour Organization. 2014**. "Does Investing in Education Pay Off for African Youth?" Accessed on May 5, 2017. http://www.ilo.org/global/about-theilo/newsroom/news/WCMS_237457/lang--en/index.htm.
- **International Monetary Fund (2017).** Annual Report
- **Knowles, Stephen, Paula Lorgelly, and Dorian Owen. 2002.** ''Are Educational Gender Gaps a Brake on Economic Development? Some Cross-Country Empirical Evidence.'' Oxford Economic Papers 54(1): 118–49.
- **Klasen, S. and Lamanna, F., 2009.** The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries', Feminist Economics, 15: 3, 91-132.
- **Klasen, S., 1999.** Does Gender Inequality Reduce Growth and Development? Evidence from CrossCountry Regressions. Policy Research Report, Engendering Development, Working Paper No. 7. World Bank, Washington, D.C.
- **Klasen, S. 2016**. "Gender, institutions, and economic development: Findings and open research and policy issues." Courant Research Centre, Poverty, Equity and Growth Discussion Paper No. 211.

- **King, Elizabeth M., Stephan Klasen, and Maria Porter. 2008.** ‘‘Gender and Development Challenge Paper.’’ Paper prepared for 2008 round of Copenhagen Consensus Project. Mimeographed, Copenhagen Consensus Center.
- **Kingdon, G. G. (1998)** Does the labour market explain lower female schooling in India?, Journal of Development Studies, 35 (1), pp. 39±65.
- **Kingdon, G. G., Unni, J. (2001).** Education and Women’s Labour Market Outcomes in India. Education Economics, 9(2), 173-95.
- **Klasen, S. and F. Lamanna, 2009**. The Impact of Gender Inequality in Education and Employment on Gender Inequality in Education and Employment on Gender Inequality and Trade, Review of International Economic Growth: New Evidence for a Panel of Economics, 14(3): 362-379.
- **Lagerlo¨f Nils-Petter. 2003. ‘‘**Gender Equality and Long-Run Growth.’’ Journal of Economic Growth 8(4): 403–26.
- **Mitra, A., Bang, J. T., Biswas A**., **2015** ‘Gender equality and economic growth: is it equality of opportunity or equality of outcomes?’, Feminist Economics, Vol. 21(1), , pp. 110-135.
- **Pervaiz, Z. and A.R. Chaudhary, 2010**.. Gender Equality, Poverty and Social Cohesion and Economic Growth: An Empirical Economic Growth, World Bank Policy Research Investigation. Saarbrücken, Germany: LAP- Lambert Working Paper, pp: 4349. Academic Publishing.
- **Pervaiz, Z. and Chaudhary, A.R., 2010**. Class Division, Social Cohesion and Economic Growth: An Empirical Investigation. Saarbrücken, Germany: LAP LAMBERT Academic Publishing.
- **Pesaran, M.H.; Shin, Y.** An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis. In Econometrics and Economic Theory in the 20th Century: The Ragnar.
- **Pesaran, M.H., Shin, Y. and Smith, R.J. 2001.** “Bounds testing approaches to the analysis of level relationship.” Journal of Applied Economics 16: 289-326.
- **Rammohan, A., & Vu, P. (2017).** Gender Inequality in Education and Kinship Norms in India. *FeministEconomics*, *24*(1),142167. https://doi.org/10.1080/13545701.2017.1364399
- **Roncolato, L., Reksten, N. and C. Grown. 2017**. “Engendering growth diagnostics: examining constraints to private investment and entrepreneurship.” Development Policy Review 35(2): 263- 87.
- **S. Seguino 2000** Gender inequality and economic growth: A cross-country analysis World Development, 28 (7) (2000), pp. 1211-1230
- “**SDG 5:** Achieve Gender Equality and Empower All Women and Girls,” UN Women, accessed 20 February, 2017.
- **Seth, S. (2009).** Inequality, Interactions and Human Development. Journal of Human Development and Capabilities, Vol 10 , 375-396.
- **Ukhova,** Gender inequality and inter-household economic inequality in emerging economies: exploring the relationship, May 2015, Gender & Development, 23:2, 241-259, ISSN: 1355-2074 (Print) 1364-9221 (Online) Journal homepage: http://www.tandfonline.com/loi/cgde20
- **United Nations Development Programme, 2010.** Human Development Report 2010 -20 Anniversary th Edition: The Real Wealth of Nations: Pathways to Human Development. New York, USA: United Nations Development Programme.
- **Ward, J., Lee, B., Baptist, S. and Jackson, H. (2010),** ‘Evidence for action: gender equality and economic growth’, Chatham House and Vivid Economics.
- **World Bank. 2001.** Engendering Development. Washington, DC: World Bank.

*****