Impact of FDI on Income Inequality in Pakistan

Mahmood, Haider and Chuadhary, AR

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Haider Mahmood [1] and A.R. Chaudhary [2]

[1] Assistant Professor
GC University, Kechehri Road, Lahore.
Cell No. 92 321 4546369
haidermahmood@hotmail.com

[2] Professor
NCBA&E, Gulberg III, Lahore.
Cell No. 92 314 4075801
amatul.chaudhary@yahoo.com

Abstract

The study attempts to find out the impact of foreign direct investment on income inequality in Pakistan. It takes foreign direct investment, government expenditure on health and education and gross domestic product growth rate as independent variable and GINI coefficient as dependent variable. ADF, PP, Ng-Perron and Zivot-Andrews Unit root tests are used to find the unit root problem. ARDL and its error correction model are used to find the long run and short run relationships. The study finds the long run and short run relationships in the model. Foreign direct investment has a positive impact on GINI coefficient. So, foreign direct investment is responsible in increasing the income inequality in Pakistan. Government expenditure on health and education has a negative relationship with income inequality. Economic growth has an insignificant impact on income inequality.

Key Words: FDI, Income Inequality, Economic Growth, Cointegration

Introduction

Foreign Direct Investment (FDI) increases the labor productivity in both domestic and foreign firms. FDI may increase the greater productivity and skills in particular sectors than the other ones, so FDI can increase wage differences in different sectors which can result in income inequality (Berman and Machin, 2000). FDI is done usually in skill-intensive sectors and it also raises the skills through training and can increase the wage differential and income inequality in skilled and unskilled labor force (Feenstra and Hanson, 1995). FDI creates the positive spillovers on domestic investments and income of capital owners raised due to high profit margins, so FDI increases the income inequality amongst self-employed business community and employees (Weeks, 1999). Income inequalities also depend on distribution of population in urban and rural areas because greater economic activities, FDI and source of employment would be in urban area, so FDI can increase the income levels of urban labour. So, it can increase the income inequality between urban and rural labor. As in Pakistan, there is greater population residing in rural area which could not get benefits of foreign investment, so it could contribute in increasing income inequality in Pakistan.

Literature Review

FDI could increase income inequality by increasing the gap between skilled and unskilled labor in less developed host countries (Feenstra and Hanson, 1997). Markusen and Venable (1997) stated that effect of FDI on wage inequality depended on FDI restriction, relative endowment, trade cost and country size. Mayne (1997) advocated that the impact of FDI on poverty reduction depended on the policies of host country, role of institutions, nature of investment, flexibility of labor market and the nature of regulatory framework. Roemer and Gugerty (1997) found that with increase in the rate of growth in per capita GDP, incomes of bottom 40% of poor population were also increased at same rate approximately.

Aghion and Howitt (1998) stated that wage inequality decreased with rising FDI in host developed countries. Nordstrom et al. (1999) stated that FDI had scale effects through economic growth, enhancing economic activities, promoting employment levels, increasing productivity levels, skill improvement, helping country to bear unexpected shocks and through all these channels helping poverty reduction. Saravanamuttoo (1999) claimed that capital formation was done by domestic and foreign investors. Levels of investment were responsible for productive employment and thus resulted in poverty alleviation, but low level of investment, especially rate of investment lower than population growth, did not have capacity to reduce poverty levels.

Dollar and Kraay (2002) found by using Deninger and Squire data base that there was a positive relationship between FDI and economic growth and incomes of the poor increased proportionally with increase in economic growth. Kakwani (2000) found that the positive effects of FDI were greater than negative effects and that was resulted in economic growth and poverty reduction. Klein et al. (2001) claimed that FDI enhanced quality of economic growth, increased safety net for country through government that led programs to redistribute income and assets, reduced financial instability shocks to the poor and thereby reduced poverty level in a country. According to Hayami (2001), Todaro and Smith (2003), FDI was a source of filling the gap between desired investment and domestic savings and was enhancing the use of technology, productivity of host country and helped in breaking the vicious circle of underdevelopment.

Mah (2002) found a positive relationship between FDI and income inequality in South Korea. Hanson (2003) conducted a study in Mexico and found that foreign investors raised the demand for skilled labor which gave more benefits to skilled labor than the unskilled labor. Lipsey and Sjoholm (2004) also found the same results. Figini and Gorg (2006) found that initially wage inequality increased with increase in FDI and reduced with further increase in FDI. Nunnenkamp et al. (2007) found that FDI promoted growth in Bolivia and increased income inequality. Basu and Guariglia (2007) found the same results by using the panel data of 119 developing countries.

Model Specification and Methodology

To capture the impact of FDI on income inequality, the study uses GINI coefficient as dependent variable and uses FDI, government expenditure on health and education as percentage of GDP and GDP growth rate as independent variables. Government spending on health and education improves the quality of life of the poor people who have not sufficient fund to invest on them. Government in developing countries usually spends on the primary health and education which is helpful in reducing poverty and income inequality. The relationship between poverty, health and education can also be observed in the health and education standards of rich and poor countries. The high income countries have high life expectancy, low infant mortality rates and high literacy rate. While poor countries have low life expectancy, high infant mortality rate and low literacy rate. So, level of government spending on health and education can affect the poverty level and income inequality. Secondly, government also invests in their people to attract FDI.

Economic growth usually comes with reducing poverty by increasing per capita income and through equal distribution of income and wealth. It would be done if country’s abundant factor of production is being utilized in production process. It can increase poverty if growth comes with high income and wealth inequalities. Economic growth with structural change can reduce inequality. For example converting from agriculture to industrial sector can reduce inequality. FDI has positive impact on economic growth and is also helping any country for structural change. FDI is usually done in industrial sector and service sector which has higher productivity than that of the primary sector. Labor force from primary sector is also trying to get job in developed sectors to increase their income levels. So, FDI reduces poverty and income inequality by providing employment. It is also due to the reason that foreign investors usually offer better salaries to domestic work force than domestic employers. FDI is also generating competition with domestic enterprises to attract labor. So, domestic employers also start to give better wages to labor. Through direct and indirect channels, FDI enhances the incomes of poor and can be helpful in reducing income inequality. The impact of FDI on income inequality is controversial with different arguments so there is need to explore it in the economy of Pakistan. The study uses FDI, government spending on health and education and growth rate simultaneous to check their impact on poverty and income inequality. In this section the study only focuses on income inequality.

Model of study is as follows:

$$GINI_t = f\,(FDIG_t\,, GEHEG_t\,, GR_t\,) \qquad (1)$$

where,

$GINI_t$ = GINI coefficient in ratio proxy for income inequality at time t
$FDIG_t$ = Foreign Direct Investment inflow in constant year 2000 US $ as percentage of GDP at time t.
$GEHEG_t$ = Government Expenditure on Education and Health as percentage of GDP at time t.
GR_t = GDP Growth Rate annual percentage at time t.

After introducing the model, study discusses the econometrics techniques to find out the accurate results. At first, the study discusses the Augmented Dickey Fuller (ADF) unit root test developed by Dickey and Fuller (1981), the equation of ADF test is as follows:

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \gamma_1 \Delta Y_{t-1} + \gamma_2 \Delta Y_{t-2} + ... + \gamma_m \Delta Y_{t-m} + u_t \quad (2)$$

The ADF equation includes $\gamma_1 \Delta Y_{t-1} + \gamma_2 \Delta Y_{t-2} + ... + \gamma_m \Delta Y_{t-m}$ to remove serial correlation. The equation (2) can also be regressed with time trend and intercept to check the trend stationary behavior of time series. Secondly, Phillips-Perron (PP) unit root test developed by Phillips and Perron (1988) is discussed. PP test ignores the $\gamma_1 \Delta Y_{t-1} + \gamma_2 \Delta Y_{t-2} + ... + \gamma_m \Delta Y_{t-m}$ from ADF equation. It removes the serial correlation by giving ranks to the residuals. Equation of PP test is as follows:

$$\Delta Y_t = \alpha + \lambda T + \delta Y_{t-1} + u_t \quad (3)$$

PP test uses the modified statistic Z_t and Z_δ which are as follows:

$$Z_t = \left(\frac{\hat{\sigma}^2}{\hat{\pi}^2}\right)^{1/2} .t_{\delta=0} - \frac{1}{2}\left(\frac{\hat{\pi}^2 - \hat{\sigma}^2}{\hat{\pi}^2}\right).\left(\frac{T.SE(\hat{\delta})}{\hat{\sigma}^2}\right), \quad (4)$$

$$Z_\delta = T\hat{\delta} - \frac{1}{2}\frac{T^2.SE(\hat{\delta})}{\hat{\sigma}^2}\left(\hat{\pi}^2 - \hat{\sigma}^2\right), \quad (5)$$

Ng and Perron (2001) developed efficient and a modified version of PP test. This test is more efficient than PP test. The set of equations for Ng-Perron test are as follows:

$$MZ_\alpha^d = (T^{-1}(y_T^d)^2 - f_0)/2k, \quad (6)$$

$$MSB^d = (k/f_0)^{1/2}, \quad (7)$$

$$MZ_t^d = MZ_\alpha^d \times MSB^d, \quad (8)$$

$$MPT_T^d = ((\bar{c})^2 k + (1-\bar{c})T^{-1})(y_T^d)^2 / f_0, \quad (9)$$

After discussing the unit root tests without structural break, the study discusses Zivot and Andrews (1992) unit root test. It uses the sequential ADF test to find the stationarity of time series with considering one unknown structural break. The set of equations of Zivot-Andrews are as follows:

$$Model\quad A:\quad \Delta Y_t = \mu_1{}^A + \gamma_1{}^A t + \mu_2{}^A DU_t(\lambda) + \alpha^A Y_{t-1} + \sum_{j=1}^{k} \beta_j \Delta Y_{t-j} + \varepsilon_t \tag{10}$$

$$Model\quad B:\quad \Delta Y_t = \mu_1{}^B + \gamma_1{}^B t + \gamma_2{}^A DT^*{}_t(\lambda) + \alpha^B Y_{t-1} + \sum_{j=1}^{k-1} \beta_j \Delta Y_{t-j} + \varepsilon_t \tag{11}$$

$$Model\quad C:\quad \Delta Y_t = \mu_1{}^C + \gamma_1{}^C t + \mu_2{}^C DU_t(\lambda) + \gamma_2^c DT_t^*(\lambda) + \alpha^C Y_{t-1} + \sum_{j=1}^{k-1} \beta_j \Delta Y_{t-j} + \varepsilon_t \tag{12}$$

where $DU_t(\lambda)$ is 1 and $DT_t^*(\lambda) = t - T\lambda$ if $t > T\lambda$, 0 otherwise. $\lambda = T_B / T$, T_B represents a possible break point. Equation is tested sequentially for T_B=2,3,....,T-1, where T is the number of observations after adjustment of differencing and lag length k.

After testing for unit root problem, the study will apply cointegration test to find the long run relationship. ARDL cointegration technique developed by Pesaran et al. (2001) is suitable in our analysis due to existence of mix order of integration. The study uses the Schwartz-Bayesian Criteria (SBC) to find the optimum lag length. SBC is known as parsimonious criteria for selecting the smallest possible lag length. To find the cointegration amongst FDI, GINI coefficient, government expenditure on health and education and GDP growth rate, the ARDL model is as following:

$$\Delta GINI_t = \delta_{l0} + \delta_{l1} GINI_{t-1} + \delta_{l2} FDIG_{t-1} + \delta_{l3} GEHEG_{t-1} + \delta_{l4} GR_{t-1} + \sum_{i=1}^{p} \beta_{l1i} \Delta GINI_{t-i}$$
$$+ \sum_{i=0}^{q} \beta_{l2i} \Delta FDIG_{t-i} + \sum_{i=0}^{r} \beta_{l3i} \Delta GEHEG_{t-i} + \sum_{i=0}^{s} \beta_{l4i} \Delta GR_{t-i} + \lambda_l D_{GINI} + \varepsilon_{lt} \tag{13}$$

In equation (13), first difference of GINI is the dependent variable, the null hypothesis is (H_0: $\delta_{l1}=\delta_{l2}= \delta_{l3}= \delta_{l4}= 0$) and alternate hypothesis is ($\delta_{l1}\neq\delta_{l2}\neq \delta_{l3}\neq \delta_{l4}\neq 0$) which shows existence of long run relationship in the model, δ_{l0} is a constant and ε_{lt} is error term. D_{GINI} is included in equation for possible structural break and to complete information. This is also shown as $F_{GINIt}(GINI_t/FDIG_t,GEHEG_t,GR_t)$. If cointegration exists in the model then long run and short run coefficients will be calculated. Error correction term can be used to find the short-run relationship in the model. Error correction model is as follows:

$$\Delta GINI_t = \gamma_l + \sum_{i=1}^{p} \beta_{l1i} \Delta GINI_{t-i} + \sum_{i=0}^{q} \beta_{l2i} \Delta FDIG_{t-i} + \sum_{i=0}^{r} \beta_{l3i} \Delta GEHEG_{t-i}$$

$$+ \sum_{i=0}^{s} \beta_{l4i} \Delta GR_{t-i} + \phi_l D_{GINI} + \varphi_l ECT_{t-1} + \zeta_{lt} \quad (14)$$

φ_l is showing the speed of adjustment from short run disequilibrium to long run equilibrium. Afterwards, diagnostic tests will be used to check the normality, functional form, heteroscedasticity and serial correlation in the model. CUSUM and CUSUMsq statistics will be used to ensure the stability of parameters.

Data

Data on foreign direct investment, GDP, GDP growth rate and government expenditure on health and education are taken from World Bank (2010). Data on GINI coefficient is taken from Jamal (2004). Data is taken from 1973 to 2003. Data is taken from 1973 to 2003 due to non-availability.

Empirical Results

The study uses the Augmented Dickey Fuller (ADF), Phillip-Perron and Ng-Perron tests to check the unit root problem in all variables in the model. Results are given in the table below.

Table 1
Unit Root Tests at Level

Variable	**ADF**	**PP**	**Ng-Perron**			
			MZ_a	**MZ_t**	**MSB**	**MPT**
Model Specification: Intercept						
$GINI_t$	-0.271(4)	0.126 (8)	1.843 (4)	2.632	1.129	6.428
$FDIG_t$	-2.187(1)	-2.185(1)	-2.037(0)	-0.919	0.451	11.134
$GEHEG_t$	-2.099(1)	-2.047(2)	-4.584(1)	-1.707	0.279	4.471
GR_t	-4.945**(1)	-5.173**(2)	-14.429**(1)	-2.707**	0.178*	0.643**
Model Specification: Intercept & Trend						
$GINI_t$	-0.432(2)	-0.632 (9)	-4.827 (5)	1.968	0.589	8.152
$FDIG_t$	-2.781(0)	-2.646(2)	-10.867(0)	-2.136	0.196	9.297
$GEHEG_t$	-2.125(1)	-2.081(2)	-7.412(1)	-1.905	0.257	12.329
GR_t	-5.471**(0)	-5.470**(1)	-12.328(0)	-1.943	0.151*	5.732*

Note: * and ** show stationarity of variable at the 0.05 and 0.01 level respectively. Brackets include the optimum lag length.

Table (1) shows that $GINI_t$, $FDIG_t$ and $GEHEG_t$ are non-stationary at level. GR_t is stationary at 1% level of significance with intercept in ADF, PP and Ng-Perron (MZ_a, MZ_t and MPT) tests and it is stationary at 5% level of significance with Ng-Perron (MSB) test. GR_t is stationary with both intercept & trend at 1% level of significance with ADF and PP tests, at 5% level of significance with Ng-Perron (MPT and MSB) test and it is non-stationary with Ng-Perron (MZ_a and MZ_t) tests.

Table 2
Unit Root Test: Zivot-Andrews

Variable	k	Year of Break	α	t_α	Type of Model
$GINI_t$	2	1985	-0.001	-1.013	C
$FDIG_t$	3	1999	-1.252*	-4.739	B
	3	1995	-1.523*	-5.206	C
$GEHEG_t$	1	1984	-0.476	-3.272	A
	0	1991	-0.621	-3.097	B
	0	1988	-0.773	-3.159	C
GR_t	5	1985	-2.080*	-4.486	A
	5	1986	-2.350*	-4.624	B
	5	1986	-2.602*	-5.058	C

Note: * and ** show stationarity of variable at 1% and 5% level of significane.

Table (2) shows $GINI_t$ is non-stationary with significant break for the year 1985 in both intercept & trend. $FDIG_t$ become stationary at 5% level of significance with significant break in trend for the year 1999 and with significant break for the year 1995 in both intercept and trend. $GEHEG_t$ is non-stationary with significant break for the year 1984 in intercept, with significant break for the year 1991 trend and with significant break for the year 1988 in both intercept & trend. GR_t is stationary at 5% level of significance with significant break in the year 1985 in intercept, with significant break in 1986 in trend and with significant break in 1986 in both intercept & trend.

Table 3
Unit Root Tests at First Difference

Variables	ADF	PP	Ng-Perron			
			MZ_a	MZ_t	MSB	MPT
Model Specification: Intercept						
$dGINI_t$	-4.173**(4)	-8.218**(8)	-19.534**(6)	-8.732**	0.032**	0.049**
$dFDIG_t$	-8.222**(1)	-9.079**(2)	-13.239*(1)	-2.517*	0.190*	2.063*
$dGEHEG_t$	-7.627**(2)	-7.598**(1)	-13.849**(0)	-2.611**	0.189*	1.825*
dGR_t	-6.732**(1)	-8.726**(3)	-14.273**(1)	-3.173**	0.097**	0.662**
Model Specification: Intercept & Trend						
$dGINI_t$	-5.863**(3)	-4.843**(4)	-17.732*(1)	-2.373*	0.109*	2.119*
$dFDIG_t$	-8.604**(1)	-9.402**(2)	-24.319**(0)	-4.445**	0.148*	5.594*
$dGEHEG_t$	-7.494**(2)	-7.494**(1)	-19.956**(0)	-2.913*	0.180*	5.474*
dGR_t	-6.632**(1)	-6.832**(2)	-17.843**(0)	-3.157**	0.103**	5.183**

Note: * and ** show stationarity at 5% and 1% level of significance. (.) contains optimum lag length.

Table (3) shows that $dGINI_t$ is stationary at 1% level of significance in all tests except Ng-Perron (MZ_a, MZ_t and MSB) test with both intercept & trend in which it is stationary at 5% level of significance. $dFDIG_t$ is stationary at 1% level of significance in ADF and PP tests and stationary at 5% level of significance with Ng-Perron tests with intercept. It is stationary at 1%

level of significance in ADF, PP and Ng-perron (MZ_a and MZ_t) tests with both intercept & trend and stationary at 5% level of significance in Ng-Perron (MSB and MPT) tests. $dGEHEG_t$ is stationary at 1% level of significance in ADF and PP tests and stationary at 5% level of significance with Ng-Perron (MZ_a and MZ_t) tests with intercept and stationary at 5% with Ng-Perron (MSB and MPT). It is stationary at 1% level of significance in ADF, PP and Ng-perron (MZ_a) tests with both intercept & trend and stationary at 5% with Ng-Perron (MZ_t, MSB and MPT) tests. GR_t is stationary at 1% level of significance with all tests. There is evidence for mix order of integration I(0) and I(1). So, ARDL model is suitable to apply here. The study finds the optimum lag length for ARDL model by using SBC and then includes dummy variable D_{GINI} in the ARDL model to complete the information in the model. Optimum lag length is 2 for $dGINI_t$, 0 for $dFDIG_t$,0 for $dGEHEG_t$ and 2 for dGR_t. The study select the year 1985 for break period and put 0 from 1972 to 1985 and 1 afterward in D_{GINI}. The calculated F-statistic for selected ARDL model is given in table (4).

Table 4
ARDL Bound Test: Using ARDL(2,0,0,2)

VARIABLES (when taken as a dependent)	***F-Statistic***	**At 0.05**		**At 0.01**	
		I(0)	***I(1)***	***I(0)***	***I(1)***
$D(GINI_t)$	7.737**	3.615	4.913	5.018	6.610

** Means at 1%, 5% significant levels reject the null hypotheses of no cointegration
* Means at 5% significant level reject the null hypotheses of no cointegration

Table (4) shows that F-statistic is 7.737. It is greater than upper bound value at 1% level of significance. So, null hypothesis of no cointegration is rejected of no cointegration, alternate hypothesis of cointegration is accepted and long run relationship exists in the model.

Table 5
Long Run Results: Dependent Variable is $GINI_t$

Regressor	**Parameter**	**S. E.**	**t-Statistic**	**P-value**
$FDIG_t$	1.899	0.974	1.951	0.062
GR_t	0.056	0.144	0.386	0.703
$GEHEG_t$	-3.176	0.837	-3.795	0.000
C	31.272	2.186	14.306	0.000
D_{GINI}	5.307	0.793	6.694	0.000

Note: *, ** and *** show statistically significance of parameters at the 0.10, 0.05 and 0.01 respectively. S. E. is standard error.

Table (5) shows the long run estimates based on selected ARDL model. The coefficient of $FDIG_t$ is positive and significant at 10% level of significant. So, FDI has a positive and significant impact on GINI coefficient and enhancing income inequality. The coefficient of GR_t is positive and insignificant. The coefficient of $GEHEG_t$ is negative and significant. So, government expenditure on health and education is helping in reducing income inequality.

Intercept is positive and significant. The coefficient of D_{GINI} is positive and significant. It is showing the change in intercept 1986.

Table 6
Error Correction Model: Dependent variable is $dGINI_t$

Regressor	Parameter	S. E.	t-Statistic	P-value
$dGINI_{t-1}$	0.994**	0.393	2.527	0.016
$dFDIG_t$	0.026	0.077	0.330	0.744
$dGEHEG_t$	-0.084	0.587	-0.143	0.887
dGR_t	0.031	0.103	0.302	0.765
dGR_{t-1}	0.189*	0.105	-1.803	0.084
Dc	3.667***	1.112	3.616	0.000
dD_{GINI}	0.367***	0.112	3.262	0.000
ECT_{t-1}	-0.317**	0.119	-2.659	0.014

Note: *, ** and *** show statistically significance of parameters at the 0.10, 0.05 and 0.01 respectively. S. E. is standard error.

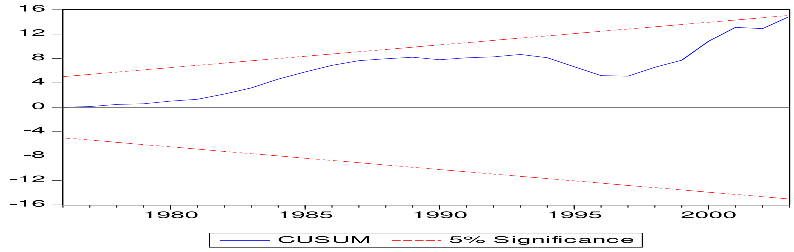
Table (6) shows that coefficients of $dFDIG_t$, $dGEHEG_t$ and dGR_t are statistically insignificant. The coefficients of $dGINI_{t-1}$ and dGR_{t-1} are significant at 5% and 10% respectively. So, the previous year income inequality is increasing the preceding year income inequality and previous year GDP growth is helping in reducing income inequality. The coefficient of ECT_{t-1} is negative and significant. It is showing short run relationship in the model. The speed of adjustment is 31.7% in a year.

Table 7
Diagnostic Tests

	LM version	P-value
Serial Correlation (χ^2)	2.014	0.171
Functional Form (χ^2)	2.537	0.111
Normality (χ^2)	1.254	0.231
Heteroscedasticity (χ^2)	0.127	0.722

Results of table (7) show that p-values of serial correlation, functional form, normality and heteroscedasticity test are greater than 0.1. So, there is no problem of serial correlation, functional form, normality and heteroscedasticity in the model.

Figure 1: CUSUM and CUSUMsq Tests



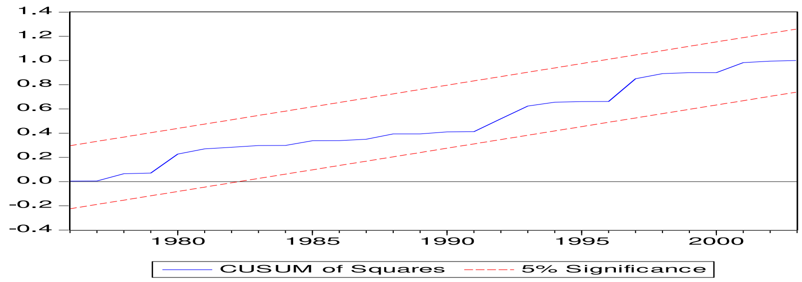


Figure (1) shows CUSUM and CUSUMsq tests. Figures show that CUSUM and CUSUMsq do not exceed the critical boundaries at 5% level of significance. This means the model of income inequality is correctly specified and long run coefficients are reliable.

Conclusions

To check the impact of foreign direct investment on income inequality, study uses FDI and government expenditure on health and education as percentage of GDP and GDP growth rate as independent variables. The study uses ARDL cointegration technique and its error correction model to check the long run and short run relationships. Results of income inequality model show that long run relationships and short run relationships exist in the income inequality model. FDI has a positive and significant impact on income inequality. GDP growth rate does not have significant impact on income inequality. Government expenditure on health and education are helping in reducing income inequality.

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