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Exploring the Impact of Financial Development on Inequality: Evidence from Three Asian Countries

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ABSTRACT

The broad objective of the present study is to investigate the impact of financial development along with some other variables namely GDP per capita, inflation rate, human capital, and trade openness for three developing Asian countries- Bangladesh, India and Pakistan. Annual time series data during the period 1980-2014 have been used for empirical investigation. After employing appropriate tests and estimation techniques, it is found that the financial development is statistically insignificant for all three countries, it implies that yet these developing countries are not efficiently allocating domestic private credit to poor segments of population. The results also reveal that inflation impedes income inequality for Bangladesh and India. GDP growth rate is insignificant for India and Pakistan however it is significant for Bangladesh having statistically positive relationship with income inequality. It means that GDP growth rate is linked with growth of income of elite class rather than bottom segments of population. National income improves inequality for Bangladesh but have insignificant affect on income inequality for India and Pakistan. Similarly, trade openness is insignificant for India and Pakistan, however it is significant for Bangladesh having statistically positive relationship with income inequality, which indicates that there is increasing unemployment in these countries due to lesser employment opportunities for skilled and unskilled labour. Empirical results of human capital shows insignificancy for India and Pakistan where as it is significant for Bangladesh; hence revealing that these countries failed to optimally utilize their resources in educational sector.

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1. Introduction

Academic debate on the issue of Inequality has radically increased in recent years. Previously, this issue was regarded as a highly sensitive political matter, thus, most of the researchers preferred to avoid rather than embrace it for scholarly investigation. Since last decade, there has been a growing concern over this issue among social scientists in general and economists in particular. In addition, the issue of inequality has received greater attention by International Labor Organization (ILO), United Nations (UN) and World Bank who have acknowledged that economic growth and well being of any nation or region is largely reliant on diminishing income inequality (Ortiz and Cummins, 2011). There are several types of inequalities that prevail in any society in terms of access to food, water, shelter, education, information and health. However, the exclusive focus of this paper is on exploring the issue of Income Inequality in selected Asian countries.

Income inequality concerns with the degree to which there exists inequity and disparity of income among the members of a given population. Income inequality is frequently discussed in terms of the percentage of income to a percentage of population. Cross-country variations in terms of income disparities and prevalent scenarios with reference to poverty are quite alarming. It is quite stunning that 1.2 Billion people (22 percent of global population) are struggling to live below $1.25 per day. The problem becomes further intensified if the poverty line is raised to $2.50 per day. It exhibits that 2.7 Billion (50 percent of global population) people are living below the poverty line. Similarly, 44.4 percent (730 Million) people in South Asia are striving to live on $1.25 to $2.50 per day (Human Development Report, 2014). Furthermore, according to Fuentes-Nieva and Galasso (2014) the wealth of 3.5 Billion poor people equals that of 85 richest people in the world. It definitely is a shocking statistic that signifies inequality prevailing in the developed as well as developing countries. In case of developing countries income inequality has ascended by 11 percent during 1990-2010 (United Nations Development Programme, 2014). Income inequality poses highly severe threats to people as it refers to inequality of opportunities to meet the requirements of life. In unequal societies, the social and economic consequences are quite worse as compared to societies where there are lesser inequalities. People living in countries where there are less income inequalities face lesser health associated risks, have longer lives, lesser probability to encounter mental disorders, perform better in their studies, are socially mobile, try to avoid indulgence in crime and violence, have lesser tendency towards illegal narcotics and other drugs, and there is lesser likelihood of giving teenage births (Wilkinson and Pickett, 2010).

Due to aforementioned consequences of income inequalities, economic growth and development of unequal societies is severely hampered. In literature, many causes of income inequality have been discussed such as entrepreneurial skills and competencies of individuals, migration from rural to urban areas, inflation, unemployment, access to credit and finance and financial instability (Ang, 2010; Bittencourt, 2010; Shahbaz and Islam, 2011). In order to tackle with the issue of Income Inequality, numerous past and contemporary researchers have emphasized on financial stability through financial sector development (Greenwood and Jovanovic, 1990; Levine, 2005; Beck, Demirguc-Kunt and Levine, 2007; Demirguc-Kunt and Levine, 2009; Bittencourt, 2010; Shahbaz et al., 2015, Sehrawat and Giri, 2015). According to Beck et al. (2007) financial development can have a significant impact on income distribution and poverty levels. They further added that financial development can lessen the disparities in income inequality and poverty levels through aggregate economic growth. The role of financial sector development in the context of developing countries is deemed to be more prominent. It is because of the fact that majority of poor people do not have access to credit and finance. It has been highlighted in the literature that people living in developing countries in Asia such as Iran, Pakistan and India, toil hard to get access to finance due to their inability in terms of fulfilling collateral requirements and lack of established relationships with financial institutions (Ang, 2010; Shahbaz and Islam, 2011; Shahbaz et al., 2015; Sehrawat and Giri, 2015).

Consequently, Asian countries are ranked at the bottom in terms of Inequality-Adjusted Human Development Index developed in 2014. For instance, India, Bangladesh and Pakistan are ranked 135, 142 and 146 out of 187 countries. Gini Coefficient (income inequality indicator) for India, Bangladesh and Pakistan for years 2003-2012 was 33.9, 32.1 and 30.0 respectively (Human Development Report, 2014). However it is interesting to note that all of Asian countries did not perform poorly in terms of Income Inequality, Thailand and Malaysia can be referred to as exemplary nations where income inequality has reduced significantly during the last decade (Human Development Report, 2014). By probing the issue of income inequality in selected Asian countries, this paper makes a noteworthy contribution in understanding the role of financial development in alleviation of poverty and reducing disparities in income distribution among the population.Therefore, the broad objective of the present study is to explore empirically both the short and long run relationship between financial development and income inequality in developing Asian countries namely Bangladesh, India, and Pakistan. The outcomes are expecting to guide the

policy makers to formulate prudent public policy and thereby reduce income inequality and improve social welfare of the people. The rest of the paper is structured as follows. Section 2 reviews the literature with respect to relationship between financial development and income inequality, Section 3 elaborates data and methodology. Section 4 exhibits the findings of the study; Section 5 entails discussion, implications and conclusion. Lastly, section 6 offers recommendation for future research.

2. Literature Review

The relationship between financial development and economic growth has been extensively studied in the past. There are numerous studies that have linked financial development to economic growth (see, for instance, Schumpeter, 1934; Robinson, 1952; McKinnon, 1973; Shaw, 1973; King and Levine, 1993; Levine, Loayza and Beck, 2000; Benhabib and Spiegel, 2000; Christopoulos and Tsionas, 2003; Ang and McKibbin, 2007; Ang, 2010, Kar et al, 2011; Nyamongo et al, 2012). It clearly indicates that the relationship between financial development and economic growth has grabbed the attention of several past as well as contemporary researchers. One of the underlying rationales pertaining to financial development and economic growth relationship is that financial development substantially improves the allocation of capital and lessens capital market imperfections (Levine, 2005). However, the most intriguing question in this regard is that who actually exploits the maximum benefits arising from such economic growth. It may benefit the poor in terms of generating employment opportunities; however, to a greater extent it could be advantageous for the wealthier because of incremental returns and profits. In order to answer this question, it is imperative to study the financial development and income inequality linkage. With reference to income inequality, the scholastic debate was initiated by Kuznets (1955) who investigated the dynamics of income inequality with particular reference to developing nations. Surprisingly, there exist a very few noteworthy studies that have attempted to explore the relationship between financial development and income inequality. According to extant literature, there are two major theoretical hypotheses with respect to financial development and income inequality relationship. Greenwood and Javanovich (1990) envisaged an inverted U shaped relationship; whereas, a negative linear relationship was predicted by some of the other researchers (see for example, Banerjee and Newman, 1993; Galor and Zeira, 1993; Aghion and Bolton, 1997, Mookherjee and Ray, 2003, 2006).

The inverted U-shaped relationship implies that during the early phases of financial development, only beneficiaries would be the wealthier people in the society as they would be able to extract returns and profits from the newly developed financial markets. Resultantly, income inequality would be intensified. However, as the financial markets would further develop and become mature, the poor people would also be able to get access to financial markets. Hence, inequality would gradually decrease because the larger population of the society would reap the merits of financial development (Tan and Law, 2012). Non linear relationship between financial development and income inequality can be explained in terms of finance-inequality widening phenomenon and finance-inequality narrowing phenomenon.

Finance-inequality widening refers to the situation in which rich people of the society reap the benefits of financial development as they can fulfill the collateral requirements in order to get access to financial institutions, consequently their various personal and professional projects are financed by the financial intermediaries, whereas the poor and deprived section of the society fail to meet preliminary requisites pertaining to access to financial institutions. Finance-inequality widening is quite evident from the study conducted in United States by Jerzmanowski and Nabar (2013) who used a measure of banking deregulation and concluded that financial market development benefits highly educated and skilled workers more than the less educated and low-skilled workers. Thus, the inequality gap between the privileged and the deprived social class keeps on widening. Contrarily, finance-inequality narrowing refers to the scenario in which the inequality gap between the wealthier and the poor population of the society is narrowed as the poor people gradually get access to financial intermediaries. As the financial markets become more mature and liberalized, the larger section of the society can yield the benefits of financial development as they can invest for better health, education and housing facilities. Hence, financial development results in reducing income inequality (Shahbaz et al., 2015).

3. Empirical methodology

3.1 Data sources and variable explanation

Annual time series data covering the time period 1980 to 2014 has been used in this study. Data have been collected from World Bank Development Indicators (2015) and House Hold Income Inequality from Penn World Data (2014). Financial year 1990 has been used as the base year in order to convert current price data into constant price

time series.

The present study also takes the natural logarithm of Gini coefficient which were used in recent empirical works like Liang (2006a), Liang (2006b), Ravallion and Chen (2007). Gini coefficient makes direct comparison of population irrespective of their sizes and incorporates full information measures by looking at all parts of the population distribution. Therefore, in economic literature, Gini coefficient is the broadly used measure for inequality. Existing literature suggested many variables to be proxy for financial development like Rousseau and Wachtel (1998), Rioja and Valev (2004) and Levine et al. (2000) used ratio of liquid liabilities including central bank, deposit money bank and financial institutions to GDP denoted by LLY to measure the overall size financial intermediary sector. To avoid the problem of ignoring the allocation of capital Demetriades and Hussein(1996) and King and Levine (1993) used the ratio of credit to the private sector to GDP denoted by PRIVO. The present study uses the ratio of money supply M_2 to GDP as Financial Depth,suggested by Levine et al.(2005).

In addition to the measure of Gini coefficient and financial development, this paper incorporates other variables which control other factors linked with either financial development or income inequality. Following Beck et al. (2007) and Ang (2010), the other variables included are: the growth rate of per capita GDP (GRO), inflation rate (INF), Human Capital that is Government expenditure on education, total (% of GDP), financial depth Money and quasi money (M2) as percentage of GDP and trade Openness (TR=EXPORT+IMPORT/GDP) are used. It is evident from the literature like Barro (2000), Beck et al. (2007) and Ang (2010) concluded that the increase in growth rate of per capita supports is lessening the income inequality. Hence, the association between the GRO and Gini coefficient should be negative. The literature remains indecisive about the effect of INF on the income inequality. Cutler and Katz (1991), Clarke et al. (2006) and Ang (2010) pointed out that the inflation and income inequality have positive relationship. Easterly and Fischer (2001) and Beck et al. (2007) believed that inflation has a negative effect on the income inequality, on the other side Bulir (2001) argued that the inflation rate improves the income inequality in the low inflation economies while in high inflation economies inflation rate worsens the income inequality. TRO is the sum of exports and imports as a percentage of GDP. Barro (2000) and Ang (2010) pointed out that trade openness positively affects income inequality.

Before starting to perform any empirical estimation of the model, it is required to analyze the time series data. The analysis of data depends on finding out whether the series is stationary or non–stationary. Augmented Dickey-Fuller (ADF) test examines the hypothesis that the variable in question has a unit root. The Akaike Information Criterion (AIC) is used to select the optimum ADF lag. Stationarity of the variables is checked once when an intercept is included, and then when both an intercept and a linear deterministic trend are included. If the series is found to have a unit root differencing the data is appropriate to make it stationary.

3.2 Methodology

To test the hypothesis that income inequality depends on financial development along with other variables such as inflation rate, trade openness and growth rate of per capita GDP, % of GDP, Human capital and financial Depth, the following econometric regression equation is used:

$$lnGINI_{ti} = \alpha_0 + \alpha_1 lnFD_{ti} + \alpha_2 GRO_{ti} + \alpha_3 TRO_{ti} + \alpha_4 INF_{ti} + \alpha_5 HUMAN_{ti} + \alpha_6 GDP_{ti} + \varepsilon \quad (1)$$

Where GINI is used to measure the income inequality, FD is the financial depth, GRO is the growth rate of per capita GDP, INF is the inflation rate, HUMAN is used for Human capital, GDP is growth rate and TRO is used to represent trade openness. In order to check the existence of long run relationship among the variables included in this study, Johansen Likelihood Ratio (LR) test is used. Once it is found that the regression variables have long term relationship (cointegration), and then Error Correction Mechanism (ECM) is used to ascertain the short term behavior of the variables. In Error Correction Mechanism (ECM), first, difference of dependent variables are regressed on first difference of all independent variables and the lag value of residual is obtained from regression of variables at level. The parameters of all independent variables show short term effects of independent variables on dependent variables, and parameter of lag value of residual will show rapidity in which the short term disequilibrium will be restored. Therefore, the following error correction model is estimated:

$$\Delta lnGINI_{ti} = \alpha_0 + \alpha_1 \Delta FD_{ti} + \alpha_2 \Delta GRO_{ti} + \alpha_3 \Delta TR_{ti} + \alpha_4 \Delta INF_{ti} + \alpha_5 \Delta GDP_{ti} + \alpha_6 \Delta HUMAN_{ti} + \alpha_5 \mu_{t-1} + \varepsilon \quad (2)$$

Where, in Error Correction Mechanism (ECM) equation, dependent variable depends on the equilibrium error term (u_{t-1}) besides other independent variables. The parameter of equilibrium error term is expected to be negative. The

positive/negative value of u_{t-1} acting with their respective parameter brings equilibrium in short term. If all other independent variables have positive short-term aggregate impact on dependent variables, then u_{t-1} must be positive, so that the negative parameter makes it negative and restores the equilibrium. In similar fashion if all other independent variables have negative short-term aggregate impact on dependent variables, then u_{t-1} must be negative, so that the negative parameter makes it positive and restores the equilibrium. The absolute value of parameter indicates how quickly the equilibrium will be restored.

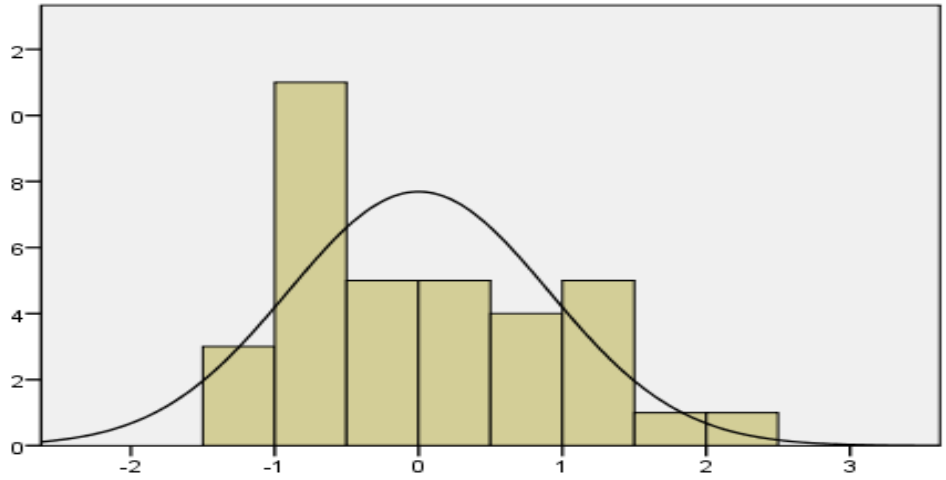
4. Results and Discussion

4.1 Empirical Results

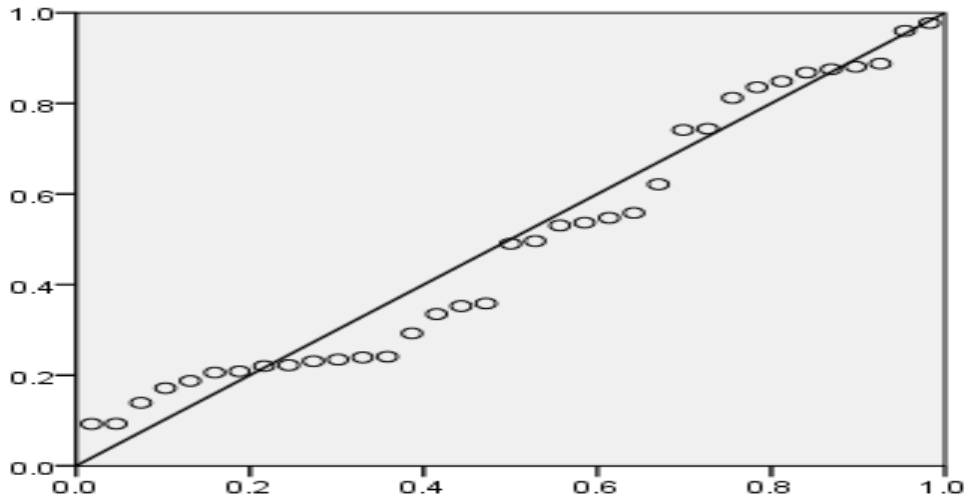
4.1.1 Normality of the Data

It is quite obvious to check normality before analysis of linear model for its coefficient determination. Histograms and Normal Probability Plot of the residuals were obtained for all the three countries from linear regression model as mentioned before. The results are shown in following histograms.

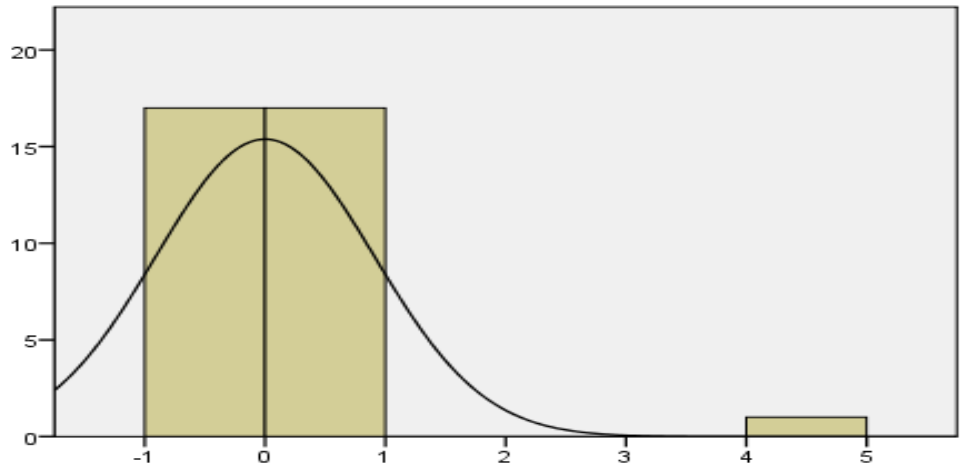
Graph 1: Histogram & Normal Probability Plot of Residual (Bangladesh)



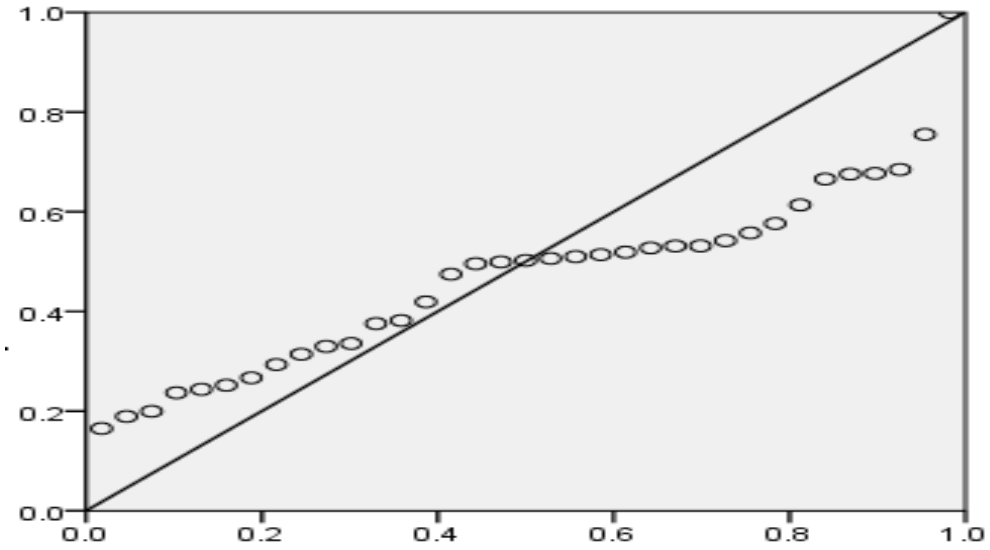
Graph 1.1



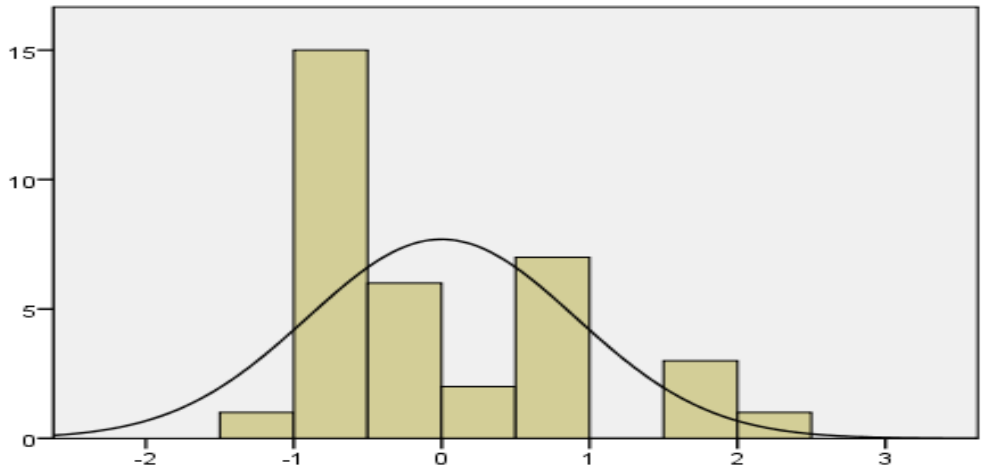
Graph 2: Histogram & Normal Probability Plot of Residual (India)



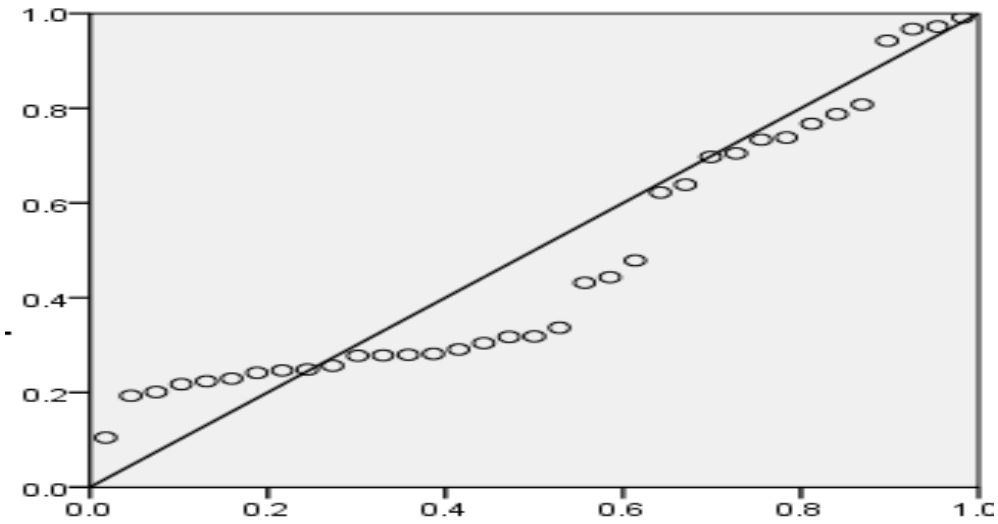
Graph 2.1



Graph 3: Histogram& Normal Probability Plot of Residual (Pakistan)



Graph 3.1

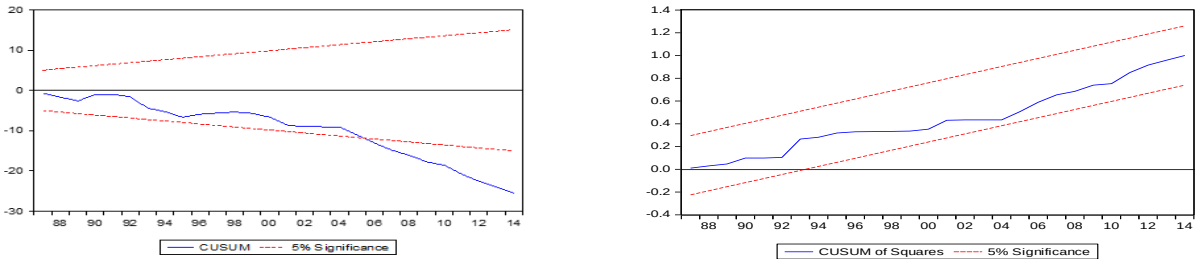


A visual study of the histograms & Normal Probability Plot for (Graph 1, Graph 2 and Graph 3) as shown above, reveal that most of the residuals lie within the normal curve, very few residual lie outside, either on left or right side, showing positive and negative Skewness, some residual lies outside on top peak, causing a little Kurtosis. As a whole data for all the three countries are normally distributed as mostly the residuals lie inside the normal curve.

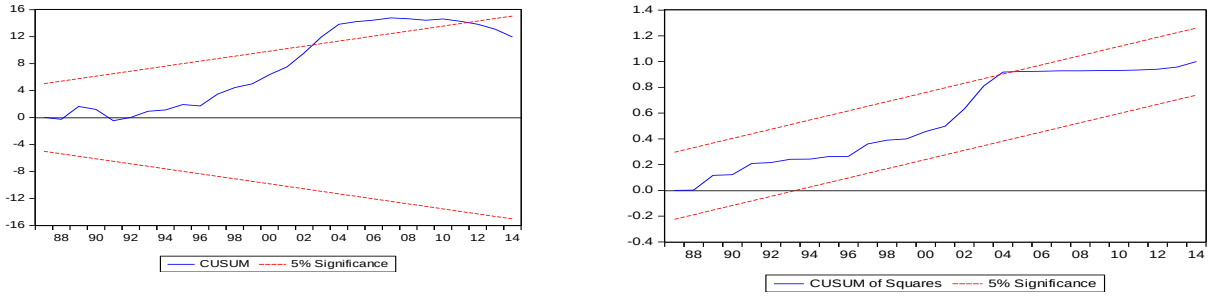
4.1.2 Model Stability Test

It is important to test model stability as country shift might affect it. In this regard Cumulative Sum of Recursive Residuals (CSUSM) and their squares (SUCSUSM) are used for model stability as proposed by Brown et al. (1975).

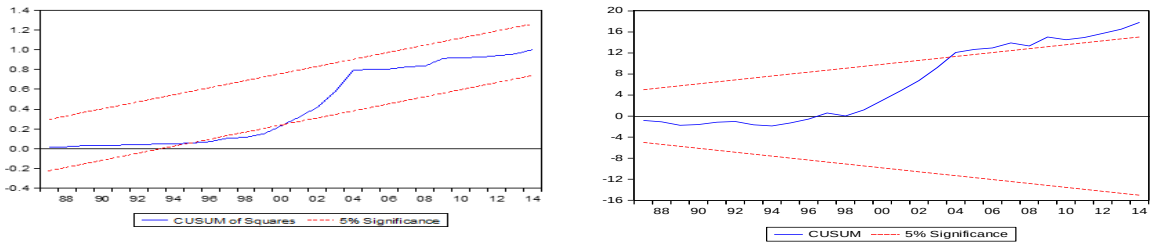
Graph 4: Plot of Cumulative Sum of Recursive Residuals (CSUSM) For Bangladesh



Graph 5: Plot of Cumulative Sum of Recursive Residuals (CSUSM) For India



Graph 6: Plot of Cumulative Sum of Recursive Residuals (CSUSM) For Pakistan



Both (CSUSM) and their square (SUCUSM) shown above in Graph 4 depicts that residuals of the model lie in the critical region indicates the model is stable throughout the period for all the three countries.

4.1.3 Park Test

Park test is being used for detection of Heteroscedasticity. First we run the log linear model for all the three countries data and save the residuals, then took the square of the saved residual and regress all the independent variables on the square of the residual. The results of Park test are given below in table 4.1.3A, 4.1.3B and 4.1.4C for Bangladesh, India and Pakistan respectively. Coefficient of all independent variables for the three models (Bangladesh, India and Pakistan) are statistically insignificant as the calculated t-statistics in absolute term for most of the variables are smaller than the tabulated value, showing no Heteroscedasticity in the models.

Table 1: Park Test Coefficients for Bangladesh

Model	Unstandardized Coefficients	Standardized Coefficients	Beta	t	Sig.
	B	Std. Error			
(Constant)	.002	.001		3.810	.001
LnFD	.000	.000	-.271	-.609	.548
LnHUMAN	.001	.000	.625	2.706	.011
LnTRO	.000	.000	-.567	-1.504	.144
LnGDP	.000	.000	-.582	-1.500	.145
LnGRO	.000	.000	.618	1.893	.069
LnINF	-0.0000840	.000	-.198	-1.251	.221

Where LnFD is natural log of Financial Development, , LnHuman is natural log of Human Capital, LnTrO is natural log of trade oppeness, LnGDP is natural log of GDP growth% , LnGRO is natural log of National Income (GDP per capital growth) and LnINF is Inflation GDP Deflator index. a. Dependent Variable: e2

Table 2: Park Test Coefficients for India

Model	Unstandardized Coefficients	Standardized Coefficients	Beta	t	Sig.
	B	Std. Error			
(Constant)	.004	.001		2.657	.013
LnFD	.000	.001	-1.005	-1.340	.191
LnHUMAN	.000	.000	-.159	-.941	.355
LnTRO	.000	.000	.904	1.480	.150
LnGDP	.000	.000	-.395	-.949	.351
LnGRO	0.0000710	.000	.206	1.083	.288
LnINF	-0.00002.87	.000	-.055	-.287	.777

Where LnFD is natural log of Financial Development, , LnHuman is natural log of Human Capital,LnTRO is natural log of trade oppeness, LnGDP is natural log of GDP growth % , LnGRO is natural log of National Income(GDP per capital growth)and LnINF is Inflation GDP Deflator index.a. Dependent Variable: e2

Table 3: Park Test Coefficients for Pakistan:

Model	Unstandardized Coefficients	Standardized Coefficient	B	t	Sig.
	B	Std. Error			
(Constant)	.001	.005		.217	.830
LnFD	.000	.001	.036	.190	.851
LnHUMAN	.000	.001	-.269	-1.476	.151
LnTRO	0.0000717	.000	.037	.195	.847
LnGDP	.000	.000	-.506	-1.770	.088
LnGRO	.000	.000	.388	1.415	.168
LnINF	.000	.000	-.219	-1.162	.255

Where LnFD is natural log of Financial Development, , LnHuman is natural log of Human Capital, LnTrO is natural log of trade oppeness, LnGDP is natural log of GDP growth % , LnGRO is natural log of National Income(GDP per capital growth)and LnINF is Inflation GDP Deflator index.a. Dependent Variable: e2

4.1.4 Non Stationarity of the Time Series

Before conducting empirical estimate of the model, it is important to examine the time series data. The analysis of the data depends on findings whether the series is stationary or non-stationary. Correlations between variables have been analyzed by Pearson Correlation Matrix. ADF; Augmented Dickey-Fuller (1981) test examines the hypothesis that the variable is in tenancy of a unit root. When the series was found to preserve data in a unit root difference, it is appropriate to make it stationary in the congressional procedure in order to avoid the problem of spurious regression of non-stationarity of the time series.Thus, results of unit root test are reported in Table 4.1.4,as shown below in which there are three SAARC- Based Z growth(GRO) , GDP, TradeOpenness(TRO), Human Capital(Government Expenditure on Education), Financial Depth (FD)and GINI IncomeInequality (IE) variables included. The result of the test shows that the seven variables are stationary at level I(0) when intercept is included except$LNINF_{Bang,}$$LNINF_{India,}$ $LNGRO_{Bang,}$ $LNGDP_{India}$, $LNTRO_{Bang}$, $LNTRO_{India}$, $LNHC_{bang}$, $LNFD_{Ban}$, $LNFD_{IND}$, $LNFD_{pak}$, $LNIE_{Bang}$, $LNIE_{india}$ and $LNIE_{Pak}$ it is stationary at level but with first difference I(I). As far as trend is considered in the model all variables are stationary at level except $LNINF_{Bang,}$$LNINF_{India,}$ $LNGDP_{India}$, $LNTRO_{India}$, $LNHC_{Bang}$, $LNFD_{Ban}$, $LNFD_{IND}$, $LNFD_{pak}$, $LNIE_{Bang}$, $LNIE_{india}$ and $LNIE_{Pak}$ that are stationery in their first difference. Almost all the variables are stationary in both the cases (when intercept is included only and when both intercept and `G trend is included) by taking values at level with first difference.

Table 4: ADF Test for Stationarity (Bangladesh, India and Pakistan)

Variables	Include Intercept Only		Include Intercept and Trend		Result
	Test statistics1	Critical Value	Test statistics1	Critical Value	
$LNINF_{Bang}$	-3.913414 [0]	-3.639407	-8.112252	-4.262735	I(1)*
	-	-	-	-	I(0)*
$LNINF_{India}$	-2.341988 [0]	-3.639407	-2.744965	-4.252879	I(0)*
	-8.893337[2] [0]	-3.646342	-8.732783	-4.262735	I(1)*
$LNINF_{Pakistan}$	-4.568532[0]	-3.639407	-4.667377	-4.252879	I(0)*
	-	-	-	-	I(0)*
$LNGRO_{Bang}$	-3.536614[0]	-2.951125[3]	-6.267406	-4.252879	I(0)**
	-13.20575[0]	-3.646342	-6.766725	-4.273277	I(1)*
$LNGRO_{India}$	-4.894563 [0]	-3.639407	-6.588460	-4.252879	I(0)*
	-	-	-	-	I(0)*
$LGRO_{Pakistan}$	-3.728861[0]	-3.639407	-3.677150	-3.548490[3]	I(0)**
	-	-	-	-	I(0)*
$LNGDP_{Bang}$	-7.894563[0]	-3.639407	-13.20253	-4.252879	I(0)*
	-	-	-	-	I(0)*
$LNGDP_{India}$	-2.587407[0]	-3.639407	-3.772542	-4.252879	I(1)*
	-8.576389 [0]	-3.646342	-8.515513	-4.262735	I(1)*
$LNGDP_{Pakistan}$	-3.775109[0]	-3.639407	-7.811738	-4.262735	I(0)*
	-	-	-	-	I(0)*
$LNTRO_{Bang}$	-2.475607[0]	-3.639407	-10.88266	-4.252879	I(0)*
	-15.65151[0]	-3.646342	-	-	I(1)*
$LNTRO_{India}$	-0.016148[0]	-3.639407	-3.087843	-4.252879	I(0)*

	-6.771507 [0]	-3.646342	-6.664818	-4.262735	I(1)*
$LNTRO_{Pakistan}$	-4.513784 [0]	-3.639407	-4.465257	-4.252879	I(0)*
	-	-	-	-	I(0)*
$LNHC_{Bang}$	-2.986598 [0]	-3.639407	-3.309720	-4.252879	I(0)*
	-8.163136[0]	-3.646342	-8.254622	-4.262735	I(1)*
$LNHC_{India}$	-4.582140 [0]	-3.639407	-4.659621	-4.252879	I(0)*
	-	-	-	-	I(0)*
$LNHC_{Pakistan}$	-6.388934 [0]	-3.646342	-6.275629	-4.262735	I(0)*
	-	-	-	-	I(0)*
$LNFD_{Bang}$	-0.772995[0]	-3.639407	-2.295986	-4.252879	I(0)*
	-4.706943[0]	-3.646342	-4.670874	-3.552973	I(1)*
$LNFD_{India}$	-0.432653[0]	-3.639407	-1.366774	-4.252879	I(0)*
	-4.436287 [0]	-3.646342	-4.361975	-4.262735	I(1)*
$LNFD_{Pakistan}$	-2.628106[0]	-3.639407	-2.548322	-4.252879	I(0)*
	-5.445069 [0]	-3.646342	-5.432816	-4.262735	I(1)*
$LNIE_{Bang}$	-3.699761[0]	-3.639407	-6.475282	-4.273277	I(1)*
	-6.213876[0]	-3.646342	-	-	I(0)*
$LNIE_{India}$	-1.465064[0]	-3.639407	-2.710653	-4.252879	I(0)*
	-5.471743 [0]	-3.646342	-5.628972	-4.262735	I(1)*
$LNIE_{Pakistan}$	-1.961043[0]	-3.639407	-1.695246	-4.252879	I(0)*
	-5.994004 [0]	-3.646342	-6.299824	-4.262735	I(1)*

[1]Figures in square brackets besides each statistic represent optimum lags selected using the minimum AIC value, [2]Figures in Parentheses are first difference of variables, [3] AT 5% Significant level, * Show result when the intercept is only included, ** Show results when intercept and trend is included.

4.2 Co-integration Analysis

Summary of the detail of regression estimates of the Johansen co-integration test as specified by Bayer and Hanck. (2013) are given in Table 4.1.5.as shown below, Where, the result indicates that first three for Bangladesh, first four for India and first and last null hypothesis for Pakistan are rejected as Maximum Likelihood Ratio statistics are greater than critical value at 0.05 percent level of significance which indicates that there exists four, three and five co-integrating relationships among the variables for Bangladesh, India and Pakistan respectively.

Table 4.1.5: Cointegration Test Results

Countries	N. Hypothesis	A. Hypothesis	Maximum Likelihood Ratio Test	
			Statistics	Critical Value
Bangladesh	r=0	r=1	219.2813**	125.6154
	r<=1	r=2	150.6484**	95.75366
	r<=2	r=3	88.27245**	69.81889
	r<=3	r=4	45.00191	47.85613
	r<=4	r=5	27.39630	29.79707
	r<=5	r=6	11.45244	15.49471
	r<=6	r<=7	2.081861	3.841466
India	r=0	r=1	187.1146**	125.6154
	r<=1	r=2	121.5844**	95.75366
	r<=2	r=3	86.77489**	69.81889
	r<=3	r=4	54.75572**	47.85613
	r<=4	r=5	28.64669	29.79707
	r<=5	r=6	8.670479	15.49471
	r<=6	r<=7	0.022283	3.841466
Pakistan	r=0	r=1	147.3298**	125.6154
	r<=1	r=2	91.09221	95.75366
	r<=2	r=3	61.67796	69.81889
	r<=3	r=4	44.32651	47.85613
	r<=4	r=5	28.14463	29.79707
	r<=5	r=6	14.14139	15.49471
	r<=6	r<=7	5.271451**	3.841466

4.3 Result of Linear Regression Models

The result of the linear regression model for all the three countries are presented in Table 4.1.6, shown below, the results are logical because the explanatory power of R^2 is fairly high for Bangladesh, moderate for India and low to moderate for Pakistan; and there is no serious autocorrelation problem as shown in Durban-Watson Statistics.

Table 4.1.6 Regression Result for Bangladesh, India and Pakistan

Variables	Bangladesh			India			Pakistan		
	Coeffients	**t-statistics**	**Prob**	**Coeffients**	**t-statistics**	**Prob**	**Coeffients**	**t-statistics**	**Prob**
C	3.600	84.425	.000	3.979	48.253	.000	3.619	16.439	.000
LnINF	-.014	-2.973*	.006	-.013	-2.110**	.044	.001	.143	.888
LnGRO	-.025	-2.410**	.023	.001	.367	.716	-.003	-.407	.687
LnGDP	.069	3.207*	.003	-.041	-1.609	.119	-.018	-1.442	.161
LnTRO	.065	2.951*	.006	.022	1.594	.122	.027	1.492	.147
LnHUMAN	.106	3.825*	.001	.000	.023	.982	-.017	-.642	.526
LnFD	-0.000007	.000	1.000	.012	.380	.707	.070	1.180	.248
R^2	0.867			0.577			0.342		
Adj. R^2	0.839			0.487			0.196		
DW	1.113			0.818			0.749		
F-stat	30.451			6.378			2.340		
Prob.	0.00			0.00			0.60		

*indicates statistical significant at 1% level of significance, ** indicate statistical significant at 5% level of significance, a. Dependent Variable: LNIE

The estimates of linear regression illustrate that INF is negatively related to income inequality (IE) in Bangladesh and India -.014 and -.013 respectively. It raised positively in case of Pakistan with .001.The coefficient of INF is statistically significant at 5% level of significance for Bangladesh and India, while for Pakistan, it is statistically insignificant at 10% level, as it's P-Value is 0.888 so, INF doesn't affect the income inequality in Pakistan. The result shows that 1% increase in INF leads to decrease in income inequity by 1.4 % and 1.3% for Bangladesh and India respectively. These findings are similar with Satti et al. (2015), Shahbaz et al. (2010), Shahbaz and Islam (2011), Bluir. (2001) and Easterly and Fischer (2001). Beck et al. (2007) and Bittencourt (2010) also reported that inflation impedes income distribution in Kaghiztan, Pakistan and Brazil respectively. Moreover, Cutler and Katz (1991), Clarke et al. (2006) and Ang (2010) pointed out that the inflation and income inequality have positive relationship.

National income (GRO) is insignificant for India and Pakistan whereas it is significant for Bangladesh having statistically negative relationship with income inequality i.e. -.025. The coefficient of GRO is statistically significant at 5% level of significance for Bangladesh. The result shows that 1% increase in GRO leads to decrease in income inequality by 2.5% for Bangladesh. Theses findings contradict with Barro (2000), but are consistent with Satti et al. (2015), Shahbaz et al. (2010) who believed that growth of income improves inequality. GRO have no affect in income inequality in India and Pakistan. Growth rate (GDP) is insignificant for India and Pakistan; however, it is significant for Bangladesh having statistically positive relationship with income inequality which is .069. The coefficient of GDP is statistically significant at 5% level of significance for Bangladesh. The result shows that 1% increase in GDP leads to increase in income inequality by 6.9% for Bangladesh. These empirical findings are similar with Satti et al. (2015), Shahbaz et al. (2010), but they are in contradiction with Barro (2000) who reported negatve impact of GDP on income inequality in low income countries. GDP have no significantaffect on income inequality in India and Pakistan.

Trade Openness (TRO) is insignificant for India and Pakistan, however it is significant for Bangladesh having statistically positive relationship with income inequality which is .065. The coefficient of TRO is statistically significant at 5% level of significance for Bangladesh. The result shows that 1% increase in TRO leads to increase in income inequality by .65% for Bangladesh. TRO have no significant effect on income inequality in India and Pakistan. Human Capital (HC) shows insignificancy for India and Pakistan whereas it is significant with 1% level of significance for Bangladesh with .106. The result shows that 1% increase in HC leads to increase in income inequality by 10.6% for Bangladesh. HC have no significant effect on income inequality in India and Pakistan. P-value of Financial Depth (FD) is insignificant for all three countries namely Bangladesh, India and Pakistan. The results of FD contradict with Sebastian and Sebastian (2011) for 138 developed and under developing nations, Tan and Law (2012) for malaysia, Leing-Zhang and Xia-Lia (2012) for China, Satti et al., (2015) for Kaghistan but consistent with the results of the studies conducted by Clarke et al. (2006) for 83 developed and undeveloped

economies, Batuo et al. (2012) for african countries and Shahbaz et al. (2015) for Iran.

4.4 Error Correction Mechanism

Once it is found that the regression variables have long term relationship (cointegration), Error Correction Mechanism (ECM) is used to ascertain the short term behavior of the variables. In Error Correction Mechanism (ECM) first difference of dependent variables are regressed on first difference of all independent variables and the lag value of residual obtained from regression of variables at level. The parameters of all independent variables show short term effects of independent variables on dependent variables, and parameter of lag value of residual shows rapidity in which the short term disequilibrium will be restored. Therefore, the following error correction model is estimated:

$$\Delta lnGINI_{ti} = \alpha_0 + \alpha_1 \Delta FD_{ti} + \alpha_2 \Delta GRO_{ti} + \alpha_3 \Delta TR_{ti} + \alpha_4 \Delta INF_{ti} + \alpha_5 \Delta GDP_{ti} + \alpha_6 \Delta HUMAN_{ti} + \alpha_5 \mu_{t-1}$$

Where, in Error Correction Mechanism (ECM) equation, dependent variable depends on the equilibrium error term (u_{t-1}) besides other independent variables. The parameter of equilibrium error term is expected to be negative. The positive/negative value of u_{t-1} acting with their respective parameter brings equilibrium in short term. If all other independent variables have positive short-term aggregate impact on dependent variables, then u_{t-1} must be positive, so that the negative parameter makes it negative and restores the equilibrium. In similar fashion if all other independent variables have negative short-term aggregate impact on dependent variables, then u_{t-1} must be negative, so that the negative parameter makes it positive and restores the equilibrium. The absolute value of parameter indicates how quickly the equilibrium will be restored.

Table 4.1.7 Regression Results of Error Correction Model (ECM)

Country	ECM Equation
Bangladesh	$\Delta lnGINI_{ti} = 0.005 - 0.035\,\Delta FD_{ti} - 0.012\Delta GRO_{ti} + 0.023\Delta TR_{ti} -$ **t** = (2.595) (-1.336) (-3.182) (2.902) $0.003\Delta INF_{ti} + 0.028\Delta GDP_{ti} + 0.007\Delta HUMAN_{ti} - 0.197\mu_{t-1}$ (1.735) (0.409) (-1.514) (-1.787) **R^2 = 0.470, D = 1.718**
India	$\Delta lnGINI_{ti} = 0.002 + 0.031\,\Delta FD_{ti} - 0.00\Delta GRO_{ti} + 0.009\Delta TR_{ti} +$ **t** = (0.949) (0.780) (-0.00) (0.586) $0.00\Delta INF_{ti} + 0.028\Delta GDP_{ti} - 0.002\Delta HUMAN_{ti} + 0.524\mu_{t-1}$ (0.20) (2.093) (-0.236) (4.839) **R^2 = 0.530, D = 1.866**
Pakistan	$\Delta lnGINI_{ti} = 0.002 - 0.000\Delta INF_{ti} + 0.00\Delta GRO_{ti} - 0.002\Delta GDP_{ti} +$ **t** = (0.817) (-.017) (-0.201) (-0.454) $0.006\Delta TR_{ti} - 0.008\Delta HUMAN_{ti} + 0.008\Delta FD_{ti} - 0.191\mu_{t-1}$ (0.850) (-0.739) (0.189) (-1.808) **R^2 = 0.150, D = 2.069**

GINI equation for Error Correction Mechanism (ECM) indicate that first difference of income inequality ($\Delta lnGINI$) depends on first difference of real output (α_0), first difference of financial depth (ΔFD_{ti}), first difference of net income that is GDP growth per capita (ΔGRO), first difference of (ΔTR_{ti}), first difference of inflation (ΔINF_{ti}), first difference of GDP (ΔGDP_{ti}), first difference of Human capital ($\Delta HUMAN_{ti}$) and equilibrium error term u_{t-1}. The result in Table 4.1.7 as shown above for Bangladesh indicates that short-run changes in real output have statistically significant positive impact on short-run changes in income inequality. Financial depth to income inequality in short-run have negative but statistically significant impact on the short-run changes in income inequality. The short-run changes in GRO have statistically significant negative impact on the short-run changes in inequality. GDP, Human and TRO to income inequality in short-run have positive but statistically insignificant impact on income inequality. The result also indicates that about 0.197 of discrepancy in previous year is eliminated this year. It means that 19.7% short term disequilibrium will be adjusted in first year while 80.3% will carry forward to the next period.

Empirical result on India indicates that short-run changes in real output have statistically significant positive impacts on short-run changes in income inequality. Inflation (INF), financial depth (FD), GDP and trade openness (TRO) to income inequality in short-run have positive but statistically insignificant impact on the short-run changes

in income inequality. The short-run changes in Human and income (GRO) have statistically significant negative impact on the short-run changes in inequality. The result also indicates that about 0.524 of discrepancy in previous year will further inflate in next year. The coefficient of equilibrium error term indicates that any disequilibrium in short run in previous year will further inflate the disequilibrium in long run. The result for Pakistan indicates that short-run changes in real output have statistically significant positive impact on short-run changes in income inequality. Financial depth to income inequality in short-run have positive but statistically significant impact on the short-run changes in income inequality. The short-run changes in GRO and TRO have statistically significant impact on the short-run changes in inequality. GDP, Human and inflation (INF) to income inequality in short-run have negative but statistically significant impact on income inequality. The result also indicates that about 0.191 of discrepancy in previous year is eliminated this year.

5. Conclusion and recommendation

This study makes an empirical attempt by using time series data over the period of 1980-2014 in examining both the short and long run relationship between financial development and income inequality in three developing Asian countries-Bangladesh, Pakistan and India by endogenising other factors, such as GDP, GDP growth per capita (income), inflation, financial depth, human capital and trade openness. A visual study for Normality test indicates that whole data for three countries are normally distributed as most of residual lies inside normal curve. Stability test findings show that CUSUM and SUCUSUM (Brown *et al.,* 1975) lies in the critical region. No hetroscedasticity has been detected by Park test in the model. When the series is found to preserve data in a unit root difference, it is appropriate to make it stationary in the congressional procedure, in order to avoid the problem of spurious regression of non-stationarity of the time series, thus the findings indicate that all variables are stationary by taking values at level for both cases. There is no serious auto-correlation problem as shown by the Durbin–Watson statistics. Cointegration relationship between all variables for three countries leads us to accept hypothesis as there exist cointegration relationship among independent n dependent variables.

It is found that empirical model fulfills the assumptions of CLRM (classical linear regression model) as inflation impedes income inequality for Bangladesh and India while it has no shown for Pakistan.Growth rate (GDP) is insignificant for India and Pakistan however it is significant for Bangladesh having statistically positive relationship with income inequality.It means GDP is linked with growth of income of elite class rather than bottom segments of population. National income improves inequality for Bangladesh but have insignificant affect in income inequality for India and Pakistan.Trade Openness (TRO) is insignificant for India and Pakistan, however it is significant for Bangladesh having statistically positive relationship with income inequality which means there is increasing unemployment in countries by lowering employment opportunity for skilled and unskilled labour comparatively. Human Capital (HC) shows insignificancy for India and Pakistan where as it is significant for Bangladesh; it means these countries have not efficiently used there resources in educational sectors. Financial Depth (FD) is insignificant for all three countries Bangladesh, India and Pakistan. It means these developing countries are not efficient for allocating domestic private credit to poor segments of population.

Our findings indicate that income-inequality relationship for developing countries has contradictory results. In case of Bangladesh, financial development increases income inequality; These results are consistent with Wahid et al. (2011) and Barro (2000); but in case of Pakistan and India financial development mitigates income inequality, these findings are consistent with Law and Tan (2009); Shahbaz and Islam (2011); Arora (2012); Ang (2010) and Shahbaz et al. (2015) for Malaysia, Pakistan, India and Iran respectively who reported financial development impairs income distribution.The results for Bangladesh, India and Pakistan indicate that short-run changes in real output have statistically significant positive impact on short-run changes in income inequality. The empirical findings demonstrate that though the relationship is not highly cogent, but the expansion of financial sector development is indispensible.

Furthermore, the findings of this study imply that a certain level of financial development is prerequisite for reducing income inequality. There is no denial to the fact that large imbalances in distribution of income would result in highly detrimental socioeconomic impacts. As emphasized by Pickett and Wilkinson (2015) societies with higer proportions of income inequalities suffer from worse health issues which may lead to violence and other social problems in the society. Hence, it is imperative for the governments to outline policies for narrowing the income differences and ensure that merits of financial development are not limited only to the privileged section of the society. Pro-rich financial deveoplment will lead to irreversible social and economic tribulations. Thus, it is fundamental that the deprived section of the society must be benefitted from financial development in order to enhance socioeconomic development holistically. Nevertheless, it is highly plausible that different nations get

affected by distributional shocks differently as determined by their respective political and institutional set-up as well as nature of distributional shocks. It is anticipated that future researchers would give adequate attention to such details which might result in enhancing our insight about income inequality to a greater extent.

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