

**Does Globalization Shape Income Inequality?
Empirical Evidence from Selected Developing Countries**

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Abstract

As economies of the world are getting more and more interdependent, hence, a large segment of economic literature investigated the impact of globalization on income inequality. However, the empirical investigations on the impacts of globalization on income distribution are still inconclusive. Keeping in view the inconclusiveness, in this study we investigated the relationship between globalization and income inequality using five different proxies of globalization. The empirical analysis estimates five empirical models by using a panel data approach for a set of 44 developing countries spanning from 1980-2014. Considering the nature of data set, the empirical estimation has been carried out through GMM estimation technique. The findings of the study reveal that overall globalization cannot explain income inequality; however, we found insights for the positive relationship between economic globalization and income inequality in the sample countries. In addition, the findings of the study also indicate that average, and effective tariff rates explain negatively income inequality in the sample countries. Based on study findings, it is safely concluded that economic globalization and income inequality move parallel in the sample countries.

Key words: Globalization, Income Inequality, Tariff Rates, Panel Data

JEL Classification:F01, O15, F13, C23

1. Introduction

1980s was the favourable era for trade liberalization, as most of the developing countries replaced its restrictive and import substitution policies with export promotion and import liberalization policies. The primary objective of the developing countries was to integrate with developed countries in order to enhance the pace of economic growth through technological diffusion. As a result, in the last decade of the 20th century (1990s) trade flows is significantly increased, and the diffusion of technology is rapidly spread across the globe.

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However, with the advent of World Trade Organization (WTO), globalization and its impacts on income distribution got space as a heated issue among economists and policy makers. Despite the fact that, the distributional impacts of globalization is one of the appealing research subjects, though empirical literature is still away from consensus.

For instance, some studies have an optimistic view that globalization always-reducing income inequality in both developed and developing countries. These studies (Deadroff and Stern, 1994; Sylwester, 2005; Claessens and Perotti, 2007) among other argued that the integration of developing economies with developed enhance exports of developing countries, which increases economic growth, and therefore improve distribution of income in the developing countries. These studies also came with the conclusion that, in the presence of sound financial institutions in developing countries, liberalization of capital account provides accessibility of the poor people to financial resources. Accessibility to finance enhancing their capacity to invest in human capital accumulation, hence income gap between skill and unskilled labour is reducing.

Some empirical studies came with pessimistic view, that globalization always widening income gap. These studies also justified their claim in trade inflow, and argued that globalization integrates developing countries with developed countries as result in developing countries flow of capital goods, machinery, and technology increases. However, as, most of the developing countries have relatively scarcity of skilled labours, as a result demand for skilled labours increase that intern widen the wage gap increases between skilled and unskilled workers (Basu and Guariglia, 2007; Celik and Basdas, 2010). Considering the negative impact of globalization on distribution of income in developing countries, Lundberg and Squire (2003) emphasized on those trade liberalization policies, which creates an employment opportunity for the low-income class to mitigate the wage gap between skilled

and unskilled labours in the developing countries. Keeping in view this inconclusiveness, in this study we investigated the relationship between globalization and income inequality using five different proxies of globalization.²

In past a number of studies have been carried out on the distributional impact of globalization. However, most of the existing studies analyzed the impact of overall globalization, or economic globalization. However, we believe that the distributional impact of globalization deserves further investigation. Hence, unlike previous studies in this study we investigated the distributional impact of globalization more rigorously using five different proxies of globalization. In this association an empirical analysis has been carried out in case of 44 developing countries with time span from 1980-2014.

The remaining of the study is organized as follows. Section 2 presents some relevant literature on the topic. Section 3 consists of methodology including empirical model, data, and data sources, sample, and estimation technique. Section 4 comprises empirical analyses along with robustness check. The study concludes with section 5.

2. Literature Review

As this study is exploring the relationship between globalization and income inequality, hence this section of the study is devoted to review the existing literatures that have linked globalization with income inequality. Studies on the link between globalization and income inequality broadly fall into three groups. First, studies that argued for the negative effect of globalization on income distribution. For instance, in their standard trade model Stolper and Samuelson (1941) showed that wage gap might reduce due to trade openness between skilled and unskilled workers in the developing countries. The predication of this standard trade

²Five proxies of globalization have been used; Overall Globalization, Economic Globalization, Trade to GDP ratio, Average Tariff Rate, and Effective Tariff Rate.

model is empirically verified by some recent studies, for instance, Reuveny and Li, (2003); Grossman and Rossi-Hansberg, (2008) among others.

The earlier work of Stolper and Samuelson (1941); Rybczinsky, (1955); and Mundell (1957), hold the claim that trade openness prove beneficial for income distribution in developing countries; as developing countries have relatively abundant unskilled labour, therefore its exports mostly embodied with labour intensive commodities that in turn increase wages of unskilled labour.

With trade liberalization policies, country can harvest the potential gain of resource endowments. Such strategies may enhance pace of economic growth that in turn decline the dispersion of unequal income distribution in the developing countries. According to the findings of Dollar and Kraay (2001a) in 1990s the average per capita income of the liberalized developing countries increased by 5.0%, developed countries by 2.2%, and developing countries that have not liberalized is just increased by 1.4%. Similarly, in country specific study Wei and Wu (2001) found that, most of the Chinese cities participated in the liberalization process in 1970s, therefore economy become more integrated with the rest of world, as a result, income inequality gap reduced significantly between rural-urban regions.

Besides, several studies Borjas and Ramey, (1994); Francois and Nelson, (1998) found that with expansion of trade, wage inequality declined in the US economy. Whereas, number of studies found a significant and positive relationship between openness and income inequality in the developing countries such as Sachs and Shatz (1996); Barro (2000); Lundberg and Squire (2003). These studies explained their results in the growth and employment impact of globalization, and argued that trade liberalization in developing countries enhanced pace of economic growth and hence created employment opportunities. However, they hypothesized that, as the benefits of economic growth are not equally

distributed, hence poor segment of population cannot get the potential benefit of globalization, as a result income gap between skilled and unskilled labour has increased. The empirical findings of Christiaensen et al. (2002) and World Bank (2006) concluded that, economic growth is further skewed due to openness, whereas, its benefits has not been equally distributed within Sub-Saharan African countries.

Rising regional inequality within a nation is a serious concern to quantify living standards among different regions in the world. Some empirical studies showed a significant positive relationship between trade openness and regional income inequality. For instance, in country specific study Daumal (2013) found that, trade openness have a positive impact on regional income inequality among the Indian states, whereas, reduces regional inequality in case of Brazil. In addition, he found that FDI inflows reduced regional income inequalities in both Indian and Brazilian economies. Explaining the findings, he argued that as India started trade liberalization policies in mid 1980s, hence in the post-liberalization period (1991-2005), regional inequality increased with the correlation coefficient is equal to 0.96. On the other hand, Brazilian economy, trade openness reduced regional inequality in the same period, which correlation coefficient is equal to -0.75. Almost similar results have been obtained by Kanbur and Zhang (1999) of rising regional income inequality in China from 0.19 to 0.26 in the post liberalization period of 1985 to 1998. Supplement Kanbur and Zhang (1999) findings Cheng and Zhang (2002) argued that, income inequality is worsens in the cross-sectional units of an Asian economies in case of China. In similar line, Zhang and Zhang (2003) found that, trade liberalization improves regional income inequality in China.

Furthermore, several studies found that, with globalization wage premium of skilled labour is growing faster than the premium of unskilled workers in developing countries. For example, Robbins (1996) estimated the effects of globalization on worker wages premium in Colombia

with the time span from 1976-1994, and came with the conclusion that wage dispersion has increased in liberalized eras as compared to closed one. In addition, Robbins and Gindling (1999) found same results in case of Costa Rica. Green et al. (2001) examined that, on average, openness has increased the return of high-skilled qualified workers. Whereas, the opposite results obtained for the unskilled and non-educated workers in case of Brazil. Similarly, Beyer et al. (1999) found a significant positive relationship between trade liberalization and wage premium of educated workers in Chile within the time span of 1960-1996.

A reasonable number of empirical studies have investigated the relationship between globalization and income distribution in case of developed economies. For instance, Spilimbergo et al. (1999) argued for a positive relationship between trade openness and income inequality in skill-abundant developed countries. In addition, several other studies assert a significant positive relationship between trade liberalization and inequality in the developed countries (Borjas et al. 1992; Levy and Murnane 1992; Karoly and Klerman 1994; Pritchett 1997; Bernard and Jensen 2000; Silva and Leichenko 2004). Atkinson (2003) in his empirical analysis found that due to globalization income inequality has increased in the OECD countries. Similarly, Dreher and Gaston (2008) explored the relationship between globalization and income inequality using industrial wage inequality and household income inequality. Using three measures of openness of the time span 1970-2000, they concluded that income inequality increased in the OECD countries.

The empirical literature on the subject depicts a non-linear relationship between globalization and income distribution, for instance, in country specific study Jalil (2012) find that in case of China, at the start income inequality increases with the expense of openness, however, it falls after a certain level of openness. Similarly, using data set of 18 Latin

American countries, Dodson and Ramlogan (2009) argued for the inverted U-shaped relationship between trade openness and income inequality. Based on the study findings, they concluded that along with liberalization policies governments also have to prompt the redistribution policies, hence to mitigate the negative effects of trade liberalization on income distribution.

Some of the empirical evidence predicts a differential impact of trade openness on wage inequality. For instance, Wood (1997) examined that wage inequality is reduced from 1970s to 1980s in the East Asian economies, as a result of trade liberalization, which reduces the wage gap between skilled and unskilled workers. Whereas, in case of Latin American economies wage inequality is increased in 1990s. In addition, some studies found an inconclusive relationship between globalization and income inequality. For example, Hennighausen (2014) examined the relationship between trade openness and capital movements with income inequality in OECD countries. The study found no evidences of the correlation between openness and capital mobility. Similarly, Dollar and Kraay (2001 b) came with the conclusion that globalization have no impact on the income shares of the poorest quintiles in a cross-sectional studies. Similarly, Higgins and Williamson (1999), Bowles (2001), and Edwards (1997) used more sophisticated estimation techniques and came with the conclusion that trade openness cannot explain income inequality.

3 Empirical Analyses

Our objective is to analyse the income distributional effect of globalization. To meet the objective, we work with panel data set of 44 developing countries spanning from 1980-2014. We start our estimation with the following base-line model.

$$INCI_{it} = \beta_0 + \beta_1 GB_{it} + \beta_2 X_{it} + \mu_i + v_t + \varepsilon_{it} \quad (1)$$

Income inequality $INCI_{it}$ is our dependent variable; Globalization (GB_{it}) is our variable of interest that further classified in five different variables namely, overall globalization, economic globalization, trade openness, average tariff rate and effective tariff rate. X_{it} is the vector of control variables namely, per capita real GDP, dependency ratio, human capital, inflation rate and government size. Whereas μ_i and v_t denotes unobserved cross-sectional and time specific effects respectively, ε_{it} is the error term.

3.2 Definition and Construction of Variables under Consideration

The dependent variable is income inequality, a number of methods have been developed to measure income inequality. The one well standard measure of income inequality is GINI Coefficient developed by Corrado Gini (1912). The value of GINI coefficient lies between zero and one, value closer to zero indicates equal distribution, whereas, value closer to one indicates an unequal distribution of income. Most of the empirical literature captured income inequality with GINI coefficient and used the Luxembourg Income Study (LIS) database of GINI coefficient. However, this data set has two major limitations. First, the dataset is just developed for thirty richest economies of the world; second, the data set have a short time span that just start from 1990.

In this study, we used a SWIID income inequality data set, which has created by Solt (2014). This data set have some advantage over LIS data set. First, the data set is developed for a large number of countries. Second, the data set have a long time span, last but not the least, the data set is the comparison of different components of inequality, hence it is very easy to check the robustness of three different inequality approaches (consumption, income and gross income).

Among explanatory variables, the variable of interest is globalization which defines as, “the integration of regional and national economies across the borders through economic, political, social and cultural changes, and with the exchange of goods, services and capital with rest of the world economies”. The index of overall globalization is the sub-index of economic, social and political globalizations³.

Whereas, the index of economic globalization exhibits the economic integration of the national economy with rest of the world through the way of capital movements, technological spillover and exchange of goods and services. The data of economic globalization index is taken from the KOF index of globalization⁴. The two other proxies are average tariff rate (ATR_{it}) and effective tariff rate (ETR_{it}) which are the most prominent policy variables to measure the degree of openness. The (ATR_{it}) rate is usually used to represent the inflow of imported goods. The received literature, for instance Dobson and Ramlogan (2009) shows that, ATR_{it} is a relatively better measure of openness than $TOPEN_{it}$, because, the trade ratio is highly correlated with exchange rate, technological innovation and macroeconomic fluctuations, data of average tariff rate is taken from World Development Indicators (World Bank)⁵.

Effective Tariff Rate (ETR_{it}) is the ratio of tariff revenue to total imports (Kanbur and Zhang, 2005), which measures complete pattern of productivity in each industry. In addition, it measures the overall effect of tariffs on value added per unit of output in each industry, when both intermediate and final goods are imported. Along with globalization, we choose a set of control variables, keeping in view its importance, as an income distribution determinant, and its potential in the affecting of income distribution response of

³The detailed list of all variable is provided by Dreher et al. (2008)

⁴Available at <http://globalization.kof.ethz.ch/query/>

⁵<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:21051044-pagePK:64214825-piPK:64214943-theSitePK:469382,00.html>

globalization. In control variables, we have economic growth that varies both overtime and across countries. A number of studies have investigated a significant and positive relationship between economic growth and income inequality. They argued that, the benefits of an increase in economic growth cannot receive by larger segments of the population. In most of the developing economies, economic growth stimulates income gap between rich and poor peoples (Bourguignon, 1981; Li and Zou, 1998; Forbes, 2000). Furthermore, several studies explored a negative relationship between per capita GDP and income inequality (Persson and Tabellini, 1994; Glomm and Kaganovich, 2008). In this study, we use growth per capita real GDP instead of level of per capita real GDP, as it is highly correlated with inflation and financial development (Ang, 2010). The data is taken from World Development Indicator (WDI), of the World Bank.

Our next explanatory variable is dependency ratio, which includes the number of population age is younger than 15 years and its age is above 65 years. Population younger than 15 and above 65 is taken as a percentage of working age population. Dependency ratio also varies both overtime, and across countries. The data is taken from World Development Indicator (WDI), of the World Bank. Inflation can be defined as the persistence and continued increase in the general price level over the period of time. A received literature Cutler and Katz (1992), and Clarke et al. (2006) signifies the positive impacts of inflation rate on income inequality, and argued that higher inflation may decline real wages as a result employment opportunity is created, which affect income inequality. We used GDP deflator as a proxy of inflation, the data is taken from (WDI), of the World Bank.

Human capital means level of education, job and fitness expression of workers (Salvatore, p.141). Broadly human capital comprises into four ingredients that embodied in human namely skill, experience, education and intelligence. In this study, we used gross enrolment as a proxy of human capital. The variable size of government represents an actual state of

aneconomy. The government size may affect income inequality with the allocation of public goods, interference in the market place and redistributive expenditures (Dreher et al., 2008). The renewed literature Rudra (2004), Lim and D. McNelis (2014) signifies the positive impact of government spending on income inequality. In this study, we use government final consumption expenditure as a proxy of government size.

3.3 Data and Data Sources

To examine the impact of globalization on income inequality, we used dataset of forty four developing countries spanning from 1980-2014⁶. The data is collected from secondary sources, that average tariff rate and effective tariff rate are taken from World Development Indicator (WDI), of the World Bank. The data for economic globalization and overall globalization are taken from KOF index of globalization⁷, and the GINI coefficient (income inequality) is from Standardized World Income Inequality Database (SWIID) which is developed by Solt (2014).

3.4 Estimation Technique

As our data set is panel in nature; hence in the first stage empirical model is estimated with pooled OLS. However, the results of pooled OLS is inefficient as the null hypothesis of Breusch-Pagan (1979) test $\delta_u^2 = 0$ cannot be accepted for all specifications indicates that intercept values are not remain the same across cross section⁸; which directed us for Random Effect. Next, we applied the Hausman (1978) test to make a choice between Random and Fixed effects. The null hypothesis of Hausman test H_o : “fixed effects are not efficient estimates”. In all cases, the null hypothesis of Hausman test is rejected, which indicate

⁶In Appendix D table 1 presents the complete list of developing countries.

⁷ Available at <http://globalization.kof.ethz.ch/query/>

⁸ The results of Breusch-Pagan specification test are presented in Appendix “C” table 1.

for fixed effects⁹. Next, we have used Redundant Fixed Effects test to make a choice among cross section, time effect and both cross section and time effects. In all three cases the null hypothesis H_0 : “*There is no fixed effect*” is rejected for all our specifications, which indicate the existence of fixed effect¹⁰. The last but not the least, we applied the Serial Correlation (LM) Test, as the null hypothesis H_0 : “*no serial correlation*”¹¹ is rejected in all specifications. Keeping in view the results, we safely concluded that our model is dynamic in nature; hence we used the Generalized Method of Moments (GMM) developed by Arellano and Bond (1991) to estimate our dynamic model of panel data.

In dynamic panel data models, GMM has some advantages over other estimators. First, GMM allows estimation under those restrictions, which are fully supported by the theory, hence supplementary assumptions are not required. Second, most of the panel data set maintains serial correlation, GMM taking into account the serial correlation. Third, GMM provides efficient estimations even with additional moment conditions. Fourth, GMM estimators control the unobserved effects through differencing regression or instruments.

4 Empirical Findings and Interpretation

The empirical findings have been carried out through GMM techniques by using five different proxies of globalization. The GMM estimator is providing consistent and significant results in case of dynamic model. As presented earlier that, we have five specifications which contain different proxies of globalization. In specification 1, the variable of interest is overall globalization (OG_{it}) enters the model with a negative sign which is not statistically significant. This may be due to the reason that overall globalization is the composite index of three sub-indices: economic, social and political globalizations. Among these, social and political

⁹The results of Hausman specification test are presented in Appendix “C” table 2.

¹⁰The results of Redundant Fixed Effects tests are presented in Appendix “C” table 3, 4 and 5, which direct us for the existence of fixed effects.

¹¹ In Appendix “C” table 6 has the results of LM test, which direct us the existence of serial correlation.

globalizations have less response to income inequality. Our findings are in line with the findings of Bergh and Nilsson (2010) that came up with the conclusion that political and social globalizations cannot explain income distribution in the developing countries.

In model (2), the overall globalization is replaced with economic globalization (EG_{it}), which enters the model with positive sign that is statistically significant at one percent. The result indicates that economic globalization worsen the unequal distribution of income in the selected developing countries. There are two possible justifications. First, as developing countries enhance its trade ties with developed one, as a result imports of capital goods (machinery, and new technology) increases, that intern increase demand for skill labour increased. However, as developing countries have abundant of unskilled labours, hence large segment of labour force cannot harvest the benefit. This result are in line with some of the existing studies (Gopinath and Chen, 2003; Lee et al., 2006; Basu and Guariglia, 2007; Celik and Basdas, 2010). Second, FDI flow to developing countries mostly facilitated the capitalist and richest segment of population; hence a large segment of population cannot harvest the potential gain of FDI. The result is in line with the findings of IMF (2007), which lend support to the claim that FDI increase income inequality as it support richest class of the developing countries. The result is also supported by the findings of Zhang and Zhang (2003) and Jaumotte et al. (2013) argued that, capital inflow into developing countries increase wage gap between skilled and unskilled workers, as, developed countries mostly invested FDI at high-skills sectors in the developing countries¹².

In specification 3 (column 4) trade openness $TOPEN_{it}$ hold positive sign (0.004) signifying a positive impact of trade openness on income inequality. This result is in line with previous

¹² For instance, several empirical studies (Kanbur and Zhang, 1999; Zhang and Kanbur, 2001) found that, economy of China is liberalized in the decade of 1980s and become the second largest recipients of FDI, whereas, income inequality is worsens since from the last three decades. In this connection, Kratou and Goaid (2016) argued that, globalization provide more potential benefits to the rich class instead of lower class in the developing countries.

empirical findings of Marjit et al. (2004), and Asteriou et al. (2014). The following are some possible justification of the result. Liberalization of trade provides opportunity to domestic manufacturing in international market, hence to meet the requirements of international market demand manufacturing sector of developing countries adopt international quality standard in the manufacturing process, which increase demand for skilled labour and therefore increase wages of skilled labour¹³.

In specifications 4 (column 5), and 5 (column 6) the variable of interest globalization is captured with average tariff rate ATR_{it} , and effective rate ETR_{it} respectively. Both variables enter the models with negative signs (-0.046) and (-0.062) respectively that are statistically significant. The results indicate that, an increase in the tariff rates decline income inequality in the developing countries. The one possible justification is that, an increase in the tariff rates decline integration of developing countries with rest of the world. The result supplements our previous findings that economic globalization and trade openness expand income inequality in developing countries.

Moreover, when we compare the magnitude of estimated coefficients of $TOPEN_{it}$ and ATR_{it} , the coefficient value of $TOPEN_{it}$ is lower than ATR_{it} . This result are in line with some of the existing studies Edwards, (1997); Higgins and Williamson, (1999); Ravallion, (2001); Zhou et al. (2011) explained that, as $TOPEN_{it}$ is highly correlated with skill premium between skilled and unskilled workers, hence not properly explain income inequality.

Almost our control variables appear in the base line specifications with expected signs. For instance, growth of GDP per capita ($PCGDP_{it}$) holds positive sign and is statistically significant, denoting it's worsen impact on income inequality. This may be due to the fact that a large segment of population cannot harvest the benefits of economic growth in developing

¹³ In similar lines, Zhu and Trefler (2005) found that, most of the Latin American countries adopted export-led strategy in the decade of 1980s, hence, export level and wage inequality move in the same direction.

countries. The results are in line with previous findings of (Kaldor, 1956; Bourguignon, 1981; Li and Zou, 1998; Forbes, 2000)¹⁴.

The sign of our subsequent variable dependency ratio (ADR_{it}) is positive, which is significant at one percent level in most of the specifications, indicates that dependency ratio explain income inequality positively. As the number of dependents in a household increases, this will increase income gap between employed and unemployed workers in the developing countries. Our findings are in line with the empirical findings of Dreher et al. (2008); Bergh and Nilsson, (2010). Similarly, inflation holds positive sign that is significant at one percent level in most of the specifications. Similar findings have been carried out by (Cutler and Katz, 1992; Clarke et al. 2006), which show that, higher inflation negatively affect the distribution of income in the developing countries. The monetary instability has an adverse effect on income distribution, as higher inflation reduces real wages that creates an employment opportunity.

Human capital ($SSEG_{it}$) on the other hand carries a negative coefficient which is significant at one percent level indicating their positive impact on income inequality. Our findings are in line with the empirical findings of Borensztein et al. (1998); Claessens and Perotti, (2007) that found a negative relationship between investment in human capital and income inequality. They argued that poor people got easy accessibility to financial resources due to capital account liberalization, that in turn enhancing their capacity to invest in human capital accumulation. Gourdon et al. (2008) came with the conclusion that, economic globalization declines income inequality in those economies, which has at least primary educated labour force.

¹⁴ In addition, Jalil (2012) argue that emerging economy of China achieve higher economic growth in the South Asian region, whereas, income inequality is increased with same proportion as with the increase in economic growth.

Table 4.1 Empirical Findings (Dependent Variable is Income Inequality)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
PCGDP _{it}	1.11 (2.55)**	1.20 (2.59)**	1.00 (8.14)***	4.06 (3.00)***	1.32 (3.20)***
ADR _{it}	.020 (3.12)***	.028 (3.90)***	.021 (1.31)	.071 (1.55)	.037 (2.56)**
INF _{it}	.010 (11.79)***	.011 (12.40)***	.011 (8.64)***	.011 (2.44)**	.071 (9.96)***
SSEG _{it}	-0.03 (-1.86)*	-0.09 (-4.20)***	-0.18 (-4.83)***	.011 (1.51)	-0.036 (-5.17)***
EXP _{it}	-0.026 (-1.21)	-0.18 (-0.75)	.037 (1.45)	.073 (1.78)*	-0.012 (-0.96)
OG _{it}	-0.007 (-1.61)	-----	-----	-----	-----
EG _{it}	-----	.012 (4.06)***	-----	-----	-----
TOPEN _{it}	-----	-----	.004 (2.94)***	-----	-----
ATR _{it}	-----	-----	-----	-0.046 (-2.34)**	-----
ETR _{it}	-----	-----	-----	-----	-0.062 (-11.18)***
Lag Dep	.892 (28.70)***	0.89 (25.09)***	.741 (16.83)***	.491 (9.52)***	.841 (42.84)***
No of Obs	490	490	583	204	170
Number of Instruments	41	41	71	63	32
Shapiro Wilk Test	0.99	0.99	0.90	0.64	0.96
Serial Correlation	0.09	0.07	0.90	0.21	0.07
Sargan Test	29.23	24.85	25.01	17.60	24.33
P-Value	0.70	0.845	0.84	1.00	0.443

Note: ***, **, *presents level of significance at 1%, 5% 10% respectively. The values of t-statistics are in parenthesis. The dependent variable in model (1), (2), (3), (4) and (5) is income inequality which measured through Gini coefficients across the countries. Values presented for Shapiro-Wilk and Serial Correlation tests are W and P values respectively.

Similarly, Gregorio and Lee (2002) and Atif et al. (2012) argued that, public education expenditure is a prominent policy variable that declines income gap. The finding of Wood (1997) and Bensidoun et al. (2011) indicated that, economies which possess more educated labour force take more benefits from trade liberalization and the most important is the reduction of income inequality. Our findings are positively signifying the impact of

governments size (EXP_{it}) on income inequality in the developing countries. The following are some possible justifications of the result. First, as specified by World Bank, (2006); Banerjee and Somanathan, (2007); Khandker and Koolwal, (2007), that in developing countries large portion of public expenditure goes to physical infrastructure, and telecom sector, which enhances the overall pace of economic growth, however have worsened the income distribution. Second, the result could also be justified with rent seeking environment of developing countries as indicated by Rudra (2004) and Wong (2016).

To test the consistency of the estimators we apply three diagnostic tests. First is the Shapiro-Wilk (1965) test of normality, which null hypothesis is “*data are normally distributed*”. Results of Shapiro-Wilk test presented in table 4.1 shows that in all specifications the W statistics is positive and is closer to one indicates that data is normally distributed. The second, test examines whether the error term of our empirical model (Equation 1) is serially correlated or not. Results presented in table 4.1 indicate that the P-value is greater than 0.05 in all specifications, hence the null hypothesis “*no serial correlation*” is not rejected, which support the dynamic nature of our model. Third, to check the validity of instrumental variables we used the Sargan test. The P-values of Sargan test is greater than 0.05 in all specification, hence, the null hypothesis “*over identifying restrictions are valid*” is not rejected, which indicates the validity of instrumental variables.

5 Conclusion

Rising income inequality in the developing countries through the integration of world economies is a controversial issue since 1980s. However, empirical evidence on the impact of globalization on income inequality is still inconclusive. Keeping in view the inconclusiveness, in this study we revisit the basic question that “*Does globalization shape*

income inequality in developing countries”. In this association, we used five different proxies of globalization using data set of 44 developing countries for the time period 1980-2014.

Our empirical findings reveal that overall globalization is not associated with income inequality; however, economic globalization has worsened impact on income inequality. In addition, our estimates indicate that, average and effective tariff rates improve income distribution in the sample countries. Thus our results provide evidence to the worsened impact of economic globalization on income inequality in the selected developing countries.

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Appendix A

Table A1: Descriptive Statistics of Variables under Consideration

Variables	Obs	Mean	Std. Dev	Min	Max
INCI _{it}	1167	44.30	6.35	27.32	63.51
PCGDP _{it}	1435	7.32	1.05	4.95	9.62
ADR _{it}	1496	73.50	16.77	36.04	112.77
INF _{it}	1448	16.64	27.7	-27.05	265.20
HC _{it}	1055	54.973	25.37	5.12	109.62
GSIZ _{it}	1422	12.935	4.34	2.05	31.82
OG _{it}	1434	45.81	12.16	15.86	79.31
EG _{it}	1434	45.63	15.17	9.75	85.15
TOPEN _{it}	1403	63.41	33.95	13.18	199.36
ATR _{it}	745	15.68	12.99	1.4	106.5
ETR _{it}	550	11.39	4.99	1.39	28.98

Appendix B

Table B1: Pooled OLS Estimation Results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
PCGDP _{it}	1.87*** (5.85)	1.57*** (5.12)	2.06*** (4.73)	2.17*** (6.25)	2.06*** (4.73)
ADR _{it}	.090 *** (5.06)	.087*** (5.06)	.063** (2.50)	.136*** (5.66)	.063** (2.50)
INF _{it}	.026 *** (3.14)	.029*** (3.51)	.055** (2.02)	.025*** (2.67)	.055** (2.02)
SSEG _{it}	-0.013 (-1.34)	-0.014 (-1.52)	-0.015*** (-1.17)	-0.004 (-0.33)	-0.015 (-1.17)
EXP _{it}	.289*** (5.04)	.256*** (4.47)	.387*** (4.26)	.251*** (3.11)	.387*** (4.26)
OG _{it}	.062** (2.21)	-----	-----	-----	-----
EG _{it}	-----	.083*** (4.32)	-----	-----	-----
TOPEN _{it}	-----	-----	-.171** (-2.61)	-----	-----
ATR _{it}	-----	-----	-----	-.059** (-2.53)	-----
ETR _{it}	-----	-----	-----	-----	-.171** (-2.61)
BP test	31.42	37.76	4.38	7.24	4.38
Prob	0.00	0.00	0.036	0.007	0.036
No of Obs	759	759	308	411	308
SE of Reg	.027	.019	.065	.023	.065

Note: ***, **, *presents level of significance at 1%, 5% 10% respectively. The values of t-statistics are in parenthesis. The dependent variable is income inequality.

Table B2: Fixed Effects Estimation Results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
PCGDP _{it}	8.18*** (11.56)	7.87*** (12.34)	7.181** (2.04)	5.54*** (7.22)	-5.25** (-2.31)
ADR _{it}	.071*** (3.15)	.079*** (3.86)	.101 (1.58)	.055** (2.10)	.277*** (4.30)
INF _{it}	.021*** (3.74)	.029*** (3.56)	.025** (2.55)	.011** (2.18)	-.009 (-0.47)
SSEG _{it}	-0.015 (-1.01)	-0.019 (-1.41)	-0.025 (-0.39)	-0.052** (-2.39)	.007 (0.19)

EXP _{it}	.121** (2.23)	.119** (2.21)	.111 (1.38)	.204*** (3.25)	.439*** (2.82)
OG _{it}	-.092*** (-2.86)	-----	-----	-----	-----
EG _{it}	-----	-0.089*** (-3.59)	-----	-----	-----
TOPEN _{it}	-----	-----	-.017 (-0.88)	-----	-----
ATR _{it}	-----	-----	-----	-0.026* (-1.87)	-----
ETR _{it}	-----	-----	-----	-----	-0.187*** (-2.63)
BP test	31.42	37.76	23.40	7.24	4.38
P-values	0.00	0.00	0.00	0.007	0.03
No of Obs	759	759	759	411	178
SE of Reg	0.032	0.022	0.019	0.014	0.071
Hausman Test	33.33	35.06	46.06	12.81	21.07
P-values	0.00	0.00	0.00	0.04	0.001

Note: ***, **, *presents level of significance at 1%, 5% 10% respectively. The values of t-statistics are in parenthesis. The dependent variable is income inequality.

Table B3: Random Effects Estimation Results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
PCGDP _{it}	5.92*** (10.04)	6.02*** (11.01)	5.33*** (9.74)	4.03*** (6.43)	3.64*** (4.20)
ADR _{it}	.084*** (3.80)	.079*** (3.98)	.098*** (5.16)	.063** (2.51)	.183*** (4.44)
INF _{it}	.019*** (3.54)	.018*** (3.33)	.023*** (4.25)	.011** (2.08)	.016 (0.86)
SSEG _{it}	-.004 (-0.28)	-.003 (-0.23)	-.003 (-0.26)	-.035* (-1.80)	.045*** (3.03)
EXP _{it}	.092* (1.71)	.096* (1.80)	.099* (1.88)	.188*** (3.03)	.093 (1.04)
OG _{it}	-.042 (-1.39)	-----	-----	-----	-----
EG _{it}	-----	-.059*** (-2.75)	-----	-----	-----
TOPEN _{it}	-----	-----	-.007 (-0.82)	-----	-----
ATR _{it}	-----	-----	-----	-.035*** (-2.6)	-----

ETR _{it}	-----	-----	-----	-----	-0.052 (-0.90)
BP test	31.42	37.76	23.40	7.24	4.38
P-values	0.00	0.00	0.00	0.007	0.03
No of Obs	759	759	759	411	308
SE of Reg	.031	.022	.008	.013	.057
Hausman Test	33.33	35.06	46.06	12.81	21.07
P-values	0.00	0.00	0.00	0.04	0.001

Note: ***, **, * presents level of significance at 1%, 5% 10% respectively. The values of t-statistics are in parenthesis. The dependent variable is income inequality.

Appendix C: Specification Tests Results

Table C1: Bruesch and Pagan Test Results

<i>H₀: Constant Variance</i>					
	Model 1	Model 2	Model 3	Model 4	Model 5
Chai²	31.42	37.76	23.40	7.24	4.38
Probability	0.00	0.00	0.00	0.007	0.03

Table C2: Hausman Test Results

<i>Null Hypothesis: Fixed-Effects are not effective estimates</i>					
	Model 1	Model 2	Model 3	Model 4	Model 5
Chai² Values	33.33	35.06	46.06	12.81	21.07
P-Values	0.00	0.00	0.00	0.04	0.001

Table C3: Redundant Cross-Sectional Fixed Effects Test

<i>Null Hypothesis: No Fixed Effects</i>					
	Model 1	Model 2	Model 3	Model 4	Model 5
F-Values	16.07	15.87	16.09	11.53	7.47
P-Values	0.000	0.000	0.000	0.000	0.000

Table C4: Redundant Period Fixed Effects Test

<i>Null Hypothesis: No Fixed Effects</i>					
	Model 1	Model 2	Model 3	Model 4	Model 5
F-Values	22.75	18.70	21.89	15.23	5.37
P-Values	0.000	0.000	0.000	0.000	0.000

Table C5: Redundant Cross Sectional and Period Fixed Effects Test

<i>Null Hypothesis: No Fixed Effects</i>					
	Model 1	Model 2	Model 3	Model 4	Model 5
F-Values	17.92	16.31	19.87	12.32	6.66
P-Values	0.000	0.000	0.000	0.000	0.000

Table C6: Serial Correlation (LM) Test

<i>H0: no first order autocorrelation</i>					
	Model 1	Model 2	Model 3	Model 4	Model 5
F	179.244	180.653	159.087	107.528	97.718
P-values	0.000	0.000	0.000	0.000	0.000

Appendix D**Table D1: List of Sampling Countries**

Argentina	Bangladesh	Barbados	Bolivia
Botswana	Brazil	Cameroon	Chile
China	Colombia	Costa Rica	Ecuador
Egypt, Arab Rep	El Salvador	Fiji	Ghana
Guatemala	Guyana	Haiti	Honduras
India	Indonesia	Iran, Islamic Rep	Jamaica
Kenya	Malaysia	Mali	Mexico
Mozambique	Pakistan	Panama	Paraguay
Peru	Philippines	Senegal	Sierra Leone
Sri Lanka	Thailand	Turkey	Uganda
Uruguay	Venezuela, RB	Zambia	Zimbabwe