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Economic Globalization and Income Inequality: Cross-country Empirical Evidence

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ECONOMIC GLOBALIZATION AND INCOME INEQUALITY: CROSS-COUNTRY EMPIRICAL EVIDENCE

Sovna Mohanty*

Abstract

Widening income inequality has limited the growth potential of economies in the past few decades. This paper analyses the effect of economic globalization on income inequality in both cross-country and country-specific framework using panel data techniques and policy simulations. The sample comprises of developed, developing and least-developed countries in the post-liberalization period. The results show that on the whole, globalization has helped in reducing inequality in the advanced economies but has the opposite effect in low-income economies. Trade and FDI have offsetting experiences; trade worsens income distribution whereas FDI is beneficial in all the economies and helps to reduce income inequality. FDI is found to have a greater impact on reducing income inequality. The policy simulations prove that India can reduce its income inequality by adopting the strategies of high income and middle-income nations.

Keywords: Globalization, Inequality, Trade Openness, FDI, ICT

JEL Classification: F15, F63, O15

Introduction

In the past few years, most countries have experienced the effects of economic globalization which has resulted in increasing economic growth (Baddeley 2006; Rao and Vadlamannati 2011). However, the degree of economic globalization and its consequences is heterogeneous across countries and regions with varying levels of development (Heshmati 2007; McMillan and Rodrik 2011). The rise of economic globalization has benefited economic growth at the cost of income inequality within countries (Bergh and Nilsson 2010). Widening income inequality is the most defining challenge of our time as the benefits of rising income are not shared equally across all the segments of the population. The problems posed by income inequality have resulted in a debate about its implications within, and between countries (Dabla-Norris *et al* 2015). The anti-globalization argument is widening the gap between haves and haves-not (Mazur 2000). The pro-globalization argument claims that globalization has promoted equality and reduced poverty (Dollar and Kraay 2002).

Reducing inequality is the key to achieving a more egalitarian society and also addresses the welfare concerns of the individuals. If the pie grows, but the share of the poorest in the pie falls, there is no assurance that they will benefit (Im and McLaren 2015).Inequality limits the growth potential of the economies by reducing the productive capacity, with the poor unable to exploit the opportunities of economic globalization (Jaumotte *et al* 2013). Understanding the causes of inequality is fundamental to devising the policy measures that enhances the ability of the economy to benefit from economic globalization.

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Economic Globalization is a multidimensional concept and has been defined and measured variously over the years. The KOF Index of Globalization[i] by ETH Zurich was introduced in 2002 (Dreher2006). Trade Openness, FDI and ICT are used to measure economic globalization based on the first index of the economic globalization. Following Norris (2000) and Keohane and Nye Jr (2000), the KOF index defines globalization to be the process of creating networks of connections among actors at multi-continental distances, mediated through a variety of flows including people, information, ideas, capital and goods. More specifically, the three dimensions of the KOF index are economic globalization, political globalization, and social globalization. Broadly, economic globalization has two dimensions. The first index includes actual economic flows which are data on trade, FDI and portfolio investment. The second index refers to restrictions on trade and capital using hidden import barriers, mean tariff rates, taxes on international trade (as a share of current revenue) and an index of capital controls.

Assessing the impact of globalization on income inequality could help in drawing meaningful policy conclusions for income distribution and poverty reduction. The paper assesses two dimensions. The first is examining the empirical association of economic globalization indicators on income inequality for a sample of economies, belonging to various levels of economic development. The second is conducting policy simulations to look at the impact on income inequality in a cross–country as well as in a country-specific framework, particularly for India.

Review of Related Literature

The empirical research on the impact of economic globalization on income inequality is divided into two strands; one, which looks at the impact of economic globalization on income inequality using decomposition techniques and the other looks at the relation between economic globalization on inequality using decomposition techniques empirically.

There are some studies which look at the impact of economic globalization on income inequality directly (Dreher and Gaston 2008; Ezcurra and Rodríguez-Pose 2013; Heshmati 2007; Wade 2004). Wade (2004) finds that economic integration has widened the absolute income gaps. Dreher and Gaston (2008) and Ezcurra and Rodríguez-Pose (2013) study the impact using KOF globalization index and support the evidence. However, Heshmati (2007) uses A.T. Kearney index[ii] and relates low-income inequality with high globalization.Thus, the results are mixed and inconclusive. To get a clear picture, the literature which explains the impact at varying levels of economic development and also looks at the sub-components of economic globalization separately is discussed below.

Jaumotte *et al* (2013) and Milanovic (2005) have analysed the impact of globalization on income inequality at various stages of economic development. Milanovic (2005) studies the effects of globalization on income distribution within rich and developing countries and finds that at low average income level, it is the rich who benefit from openness. Openness makes income distribution worse before making it better and that the effect of openness on country's income distribution depends on initial income level. Jaumotte *et al* (2013) find that lower income inequality is associated with trade liberalization whereas higher inequalityis related to financial openness.

Few studies have looked at the different sub-components of economic globalization affecting income inequality (Asteriou *et al* 2014; Baddeley 2006; Jaumotte *et al* 2013). Baddeley (2006) studies

the impact of globalization on growth and income inequality in less developed countries and provides evidence that increase in global income inequality is related to globalization of trade and finance. Asteriou *et al* (2014) investigate the relationship between income inequality and globalization, with both trade and financial variables for the European Union countries. The results suggest that while trade openness exerts an equalizing effect, financial globalization through FDI, capital account openness and stock market capitalization is the driving force of inequality. The highest contribution to inequality stems from FDI.

Several studies have looked at the impact of trade on income distribution (Anderson 2005; Meschi and Vivarelli 2009) in developing countries. Meschi and Vivarelli (2009) estimate the impact of trade on within-country income inequality in developing countries (DCs). Their results suggest that trade with high-income countries worsen income distribution in DCs. Imports and exports from/to industrialized nations significantly worsen income distribution in middle-income countries. Anderson (2005) suggests that increased openness affects income distribution within developing countries by changing factor-price ratios, asset inequalities and the amount of income redistribution. Greater openness reduces inequality in developing countries and increases inequality in developed countries. The results do not confirm Stolper-Samuelson Theorem as they obtain a positive sign for the effect of trade liberalization on inequality for the developing economies.

There are some studies which have looked at the impact of FDI on income inequality (Chintrakarn *et al* 2012; Choi 2006; Herzer and Nunnenkamp 2013; Sylwester 2005). Choi (2006) finds a negative relationship between bilateral FDI and income inequality between countries. Outward FDI rather than inward FDI has a more detrimental effect on income distribution. Chintrakarn *et al* (2012) and Herzer and Nunnenkamp (2013) investigate the relationship between inward FDI and income inequality in the United States and Europe respectively. The results indicate that the short-run effects of FDI on income inequality are insignificant, or weakly significant and negative. In the long run, FDI exerts a significant and negative effect on income inequality in both United States and Europe. Sylwester (2005) examines the effects of foreign direct investment (FDI) on economic growth and income distribution in less developed countries (LDCs). FDI has a positive association with economic growth, but there is no evidence that FDI is increasing income inequality within this group of LDCs.

Several studies have highlighted the role of financial development, knowledge, human capital, structural change in income inequality. Adelman and Morris (1973) and Ahluwalia (1976) have tested the cross-country evidence between development and inequality and have established inverted U curve. Jaumotte *et al* (2013) and Asteriou *et al* (2014) emphasize the importance of education and structural change for studying the relation between economic globalization and income inequality. While employment shares have mixed results, reduction of inequality is also subject to education as it improves the proportion of the high skill activities. Chu (2010) and Jones and Williams (2000) find that stimulating research and development investment increases the income inequality by raising the return on assets.

The second strand explains the decomposition of income inequality. Different methods have been developed to decompose inequality (Fields and Yoo 2000; Morduch and Sicular 2002; Pyatt 1976; Shorrocks 1980, 1982 and 1984). Inequality is decomposed by various subgroups, income sources and

other socio-demographic characteristics and at different levels of aggregation. The modern inequality decomposition literature originates from Shorrocks (1980, 1982 and 1984). The decomposition of inequality is examined by income sources: by population sub-groups or by sub-aggregates of observations which share common characteristics. He shows that a broad class of inequality measures can be decomposed into components reflecting only the size, mean and inequality value of each population subgroup or income source. Fields and Yoo 2000; Morduch and Sicular 2002 proposed regression-based methods of decomposition of inequality by income sources. These methods involve estimation of standard income generating equations written regarding covariance. The size of the coefficient determines the contribution of the explanatory variables to the distributional changes.

Of the two strands of literature review elaborated above, there are clear advantages of estimating of globalization on inequality empirically. At the outset, income inequality has both income and non-income dimensions. The above decomposition based methods explain income inequality by the factor sources of income. The non-income dimension of income inequality which could account for health, education, welfare, skills, etc., are equally important and drive inequality as can be seen in the first strand of literature are left unaccounted. The first approach gives the flexibility to choose variables which aid in determining the relation between globalization and income inequality. Secondly, several studies have established a non-linear relationship between globalization and development (Adelman and Morris 1973; Ahluwalia1976; Ezcurra and Rodríguez-Pose 2013) which cannot be done using the decomposition approach.

The literature review identifies four research gaps in the existing literature. Firstly, the roles of international trade and FDI and various other factors are studied intensively but mostly separately. Secondly, in contrast to most studies that focuses on income inequality in a particular country or region, this paper concentrates on the within-country variation in inequality and controls for the differences across countries. The studies that focus on within-countryvariation have centered mostly on developed countries, and very few studies have investigated the relation between the least developed countries (Baddeley 2006; Sylwester 2005). Thirdly, the current study is different from previous studies also as it accounts for the problem of endogeneity. Fourthly, the lack of comparable Gini coefficients, both between countries and overtime, has been a major obstacle in inequality research. The Standardized World Income Inequality Database (SWIID) created by Solt (2016) has been used to handle the problem of few and non-comparable Gini measures. The SWIID database makes the estimation results more reliable.

Against this background, there are three objectives in the study. Firstly, the estimation of the impact of economic globalization on income inequality is studied using a comprehensive set of explanatory variables which includes both globalization indicators and control variables. Secondly, to gain an insight into how the factors differ in their contribution to income inequality across the various income categories, inequality is decomposed to show the contribution of globalization variables and other factors based on the dynamic panel regression results. Thirdly, policy simulations on income inequality are done.

Methodology

Estimation of the effect of globalization on income inequality involves three steps**.** In the first step, the impact of economic globalization on income inequality is analyzed. In the second step, the decomposition of the contribution of the various globalization indicators and other factors to income inequality is studied. Policy simulations evaluate the impact of globalization on income inequality in the third step.

Empirical Framework

The econometric model for capturing the globalization effect on income inequality takes the following form:

$$Gini_{it} = \alpha_0 + \alpha G_{it} + \beta X_{it} + \epsilon_{it} \quad (1)$$

Where G_{it}represents globalization variables, X_{it} represents control variables and ϵ_{it} represents the random disturbance which is assumed to be normal and identically distributed with

$E(\varepsilon_{it}) = 0$ And $Var\ (\in_{it}) > \sigma^2$.

Decomposition of inequality to show the contribution of globalization variables and other factors based on the panel regression results. The contribution to the overall annual percentage change of the income inequality of each variable is computed as the average annual change in the variable times the regression coefficient of the variable from the GMM.

$$AAGR_{Gini} = AAGR_{globalization} * (coefficients\ of\ globalization\ variables) + AAGR_{control\ variables} * (coefficient\ of\ control\ variables) \quad (2)$$

Where, *AAGR*=Average annual growth rate.

Equation (1) is estimated using panel regression models using both static and dynamic panel methods. Firstly, thestatic panel approach (fixed and random effects) is estimated. Secondly, we repeat the estimation by usingGeneralized Method of Moments (GMM) by Arellano and Bond (1991) to eliminate endogeneity bias and to capture dynamic effects.

The static panel data model for estimation of the determinants of TFP is specified as follows,

$$Gini_{it} = a_0 + a_1 GDPPer\ Capita_{it} + a_2\ GDPPer\ Capita_{it}^2 + a_3 TO_{it} + a_4 FDI_{it} + a_5 Internet_{it} + a_6 Knowledge_{it} + a_7 Education_{it} + a_8 AgriculturalEmployment_{it} + a_9 IndustrialEmployment_{it} + a_{10} DCP_{it} + \varepsilon_{it} \quad (3)$$

Where TO, tradeopenness,*FDI* is the foreign direct investment as a percentage of *GDP*, the *internet* is the number of internet users, *the patent applications measure knowledge*, *and education* by the expenditure on education, *health* is measured by health expenditure,i=number of countries, t=timeperiod.

In a dynamic setting, equation (3) is written as

$$Gini_{it} = a_0 + a_1 GDPPer\ Capita_{it} + a_2\, GDPPer\ Capita_{it}^2 + a_3 TO_{it} + a_4 FDI_{it} + a_5 Internet_{it} + a_6 Knowledge_{it} + a_7 Education_{it} + a_8 AgriculturalEmployment_{it} + a_9 IndustrialEmployment_{it} + a_{10} DCP_{it} + \theta\ Gini_{i(t-1)} + \varepsilon_{it} \quad (4)$$

Following the KOF globalization index, Trade Openness, FDI, and internet are used as explanatory variables to assess the relationship between economic globalization and income inequality. The indicators are measured as given in the KOF globalization index. Trade Openness is measured as a ratio of exports plus imports over GDP. FDI is measured as percentage net inflows of FDI to GDP. ICT is measured by taking the number of internet users in an economy.

Adelman and Morris (1973) and Ahluwalia (1976) have tested the cross-country evidence between development and inequality, and have established inverted U curve. Dreher and Gaston (2008) and Ezcurra and Rodríguez-Pose (2013) found that economic integration increases income inequality. Meschi and Vivarelli (2009) concluded that trade with high-income countries worsens income distribution in developing countries. Anderson (2005) results do not confirm Stolper-Samuelson Theorem as they obtain a positive sign for the effect of trade liberalization on inequality for the developing economies. Stolper-SamuelsonTheorem[iii] expects the coefficient of trade to depend on factor-abundance, if the country is labor-abundant<0, capital–abundant>0. Jaumotte *et al* (2013) suggest that increased financial openness is associated with higher inequality. Asteriou *et al* (2014) financial globalization through FDI, capital account openness and stock market capitalization is the driving force of inequality. Accordingly, the predicted signs of the coefficients are as following::a_1>0, a_2<0, a_3 >0 for high income countries (HIC) $a_3 < 0\ or\ a_3 > 0$for upper middle income countries (UMIC) and $a_3 < 0$ for low income countries (LIC),a_4 >0,a_5 >0.

The control variables chosen for this analysis are financial development, knowledge, human capital, structural change based on previous empirical and theoretical literature. Jaumotte *et al* (2013) and Asteriou *et al* (2014) emphasize the importance of education and structural change for studying the relation between economic globalization and income inequality. Education is essential to improve the adaptability of innovations that are introduced due to foreign investments and lead to a reduction of income inequality. The role of education in income differences is based on the work of Becker (1962) and Schultz (1961) and leads to skill deepening. Greater access to education reduces income inequality by creating job opportunities and allowing a larger proportion of the population to be engaged in high-skill activities. The study uses the gross enrolment of secondary education as an indicator of education.

In developing countries, a move away from agricultural sector is expected to improve income distribution by increasing the income of the low –earning group. The increase in relative productivity of agriculture is supposed to reduce income disparities by increasing the income of those employed in this sector. Kuznets (1955) find that as countries develop, it is anticipated that there will be a change in the inter-sectoral composition of output, with the rise in shares of industries and service and fall in the share of agriculture in the total output. The paper uses employment in agriculture and industry as indicators of structural change.

Jones and Williams (2000) underline the importance of research and development. Stimulating research and development investment increases the income inequality by raising the return on assets.

Patents are taken as an indicator of research and development in the paper. Thus the predicted signs of the coefficients can be written as: a_6>0, a_7<0, a_8 >0,a_9<0,a_{10}<0.

Financial development may reduce income inequality by increasing access to the capital to the poor. Motonishi (2006) finds that the effect of financial development on income inequality is mixed. More developed financial services enable the poor to borrow from rich and leads to a decrease in income inequality, while financial services are not available to the poor due to constraints in the credit market.

The main hypothesis of this study is:

i. The Kuznets hypothesis expects per capita GDP >0 and per capita GDP sq<0.
ii. StolperSamuelsonTheorem assumes the coefficient of trade to depend on factor-abundance, If the country is labor-abundant<0, capital –abundant>0.Thus, trade is expected to have a positive relationship in HIC and negative correlation in LIC. Though, in middle-income economies, the results could be positive or negative (a_3 >0 for HIC $a_3 < 0 \; or \; a_3 > 0$for UMIC and $a_3 < 0$ for LIC).
iii. FDI increases income inequality across all levels of economic development (a_4 >0).
iv. ICT also increases income inequality across all levels of economic development (a_5 >0).

Technique of Estimation

A sample of 115 countries is chosen which comprise of HIC (43), UMIC (28) and LIC (44) over the period 1993-2012. The list of sample countries along with their income group is given in the Appendix in Table A.1.

Equation (4) is estimated using static panel data approach.The fixed effect model assumes that the unobservable country-specific effects are fixed parameters to be estimated along with the coefficients of the model while the random effects model assumes the unobservable country-specific effects to be a random disturbance. Diagnostic tests such as Lagrangian Multiplier (LM) and Hausman tests are used to choose between the panel data models. A high value of LM favors FE model or RE model over pooled OLS. Further, the statistical significance of Hausman specification test suggests that estimation by using FE is preferable to RE model.

One of the limitations of the static panel data model is that it assumes exogeneity of all the explanatory variables. However, the disturbances contain unobservable, time-invariant country effects that may be correlated with explanatory variables. Dynamic panel data model allows for such endogeneity by employing the instrumental variable technique (Baltagi 2008)

Arellano and Bond (1991) have suggested a generalized method of moment (GMM) procedure in which the orthogonality conditions, which exist between the lagged dependent variable and the disturbancesε_{it}, is utilized to obtain additional instruments. The GMM estimator uses the lagged values of the endogenous explanatory variables as instruments to address the endogeneity problem. Equation (4) is estimated using Arellano and Bond (1991) and Blundell and Bond (1998) GMM framework, and applying a two-step GMM[iv] with robust standard error proposed by Windmeijer (2005) to estimate equation. As compared to one-step system-GMM, two-step system GMM is asymptotically more efficient.

Source and Description of Data

Dependent Variable: Among the most commonly used measures of inequality are the Gini coefficients. For completely egalitarian income distributions in which the whole population has the same income, the Gini coefficient takes a value of 0. A value of 1 indicates that all incomesare concentrated in one person. Gini coefficients can be calculated in several ways: for gross income (before taxes and transfers), net income (after taxes and transfers), and consumption expenditure. Furthermore, the unit of analysis can be individuals or households. The lack of comparable Gini coefficients both between countries and overtime is a major obstacle in inequality research. Many consider the Luxembourg Income Study (LIS) to be the best option, as it is based on reliable microdata from national household income surveys. Unfortunately, LIS data are available for only thirty countries, almost exclusively rich ones, and contain few observations from before 1990.

As a second best solution, many scholars resort to the World Income Inequality Database (WIID), created by the World Institute for Development Economics Research of the United Nations University (UNU-WIDER) which is an updated and expanded version of the Deininger and Squire (1996) dataset. The WIID contains a large set of inequality statistics from several sources including OECD Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean, generated by CEDLAS and the World Bank, Eurostat, the World Bank's PovcalNet, the UN Economic Commission for Latin America and the Caribbean, national statistical offices around the world, totaling over 5000 observations from 176 countries. However, the observations are rarely comparable across countries or over time within a single country. The Standardized World Income Inequality Database (SWIID) created by Solt (2016) has attempted to handle the problem of few and non-comparable Gini measures. The WIID database is standardized, and data from WIID and other sources mentioned above are taken into account while minimizing reliance on problematic assumptions by using as much information as possible from proximate years within the same country. The data collected by the Luxembourg Income Study is employed as the standard. The SWIID currently incorporates comparable Gini indices of net and market income inequality for 176 countries.

The database aims to improve data availability and comparability for cross-national research by exploiting the fact that different types of Gini coefficients display systematic relationships. The Gini coefficient of gross income is typically larger than the coefficient of net income, which in turn is greater than the Gini coefficient of expenditure. Similarly, Gini coefficients for households are lower than coefficients calculated on an individual basis. Gini net is used in our analysis.

The variables are defined as follows:

- Gininet: Estimate of Gini index of inequality in household disposable (post-tax, post-transfer) income, using Luxembourg Income Study data as the standard.
- Ginimarket: Estimate of Gini index of inequality in household market (pre-tax, pre-transfer) income, using Luxembourg Income Study data as the standard.

Independent variables: The independent variables are sourced from World Development Indicators, World Bank. The measurement of variables is given in Table 1 below.

Table 1: Measurement of Variables

Variables	Measurement	Source
Gini	Estimate of Gini index of inequality in household disposable (post-tax, post-transfer) income, using Luxembourg Income Study data as the standard	SWIID
Globalization Variables		
Trade Openness	Ratio of (exports of goods and services (constant 2005 US$)+imports of goods and services (constant 2005 US $) to GDP)	WDI
FDI	Ratio of Foreign direct investment, net inflows to GDP	WDI
ICT	Internet Users (per 100 people)	WDI
Control Variables		
Knowledge	Logarithm of Patent applications, residents	WDI
Human Capital	Gross enrolment ratio, secondary, both sexes (%)	WDI
Structural Change	Employment in agriculture (% of total employment)	WDI
	Employment in industry (% of total employment)	WDI
Financial Development	Domestic credit to private sector (% of GDP)	WDI
GDP per capita	GDP per capita (constant 2010 US$)	WDI

Source: Author's Compilation

Policy Simulation

The effects of globalization on income inequality are studied by conducting policy simulations and comparing the actual income inequality and predicted income inequality in India. The predicted Gini is calculated by multiplying the coefficient of the variable with the average of the variables over the income group. Then a summation of the product estimated in the first step is taken. The policy simulation can be described as following:

For the year t_1 for India,

$$Predicted\ Gini\ India\_HIC_{t_1} = C_1 G\_India_{t_1} + C_2 X\_India_{t_1} \quad (5)$$

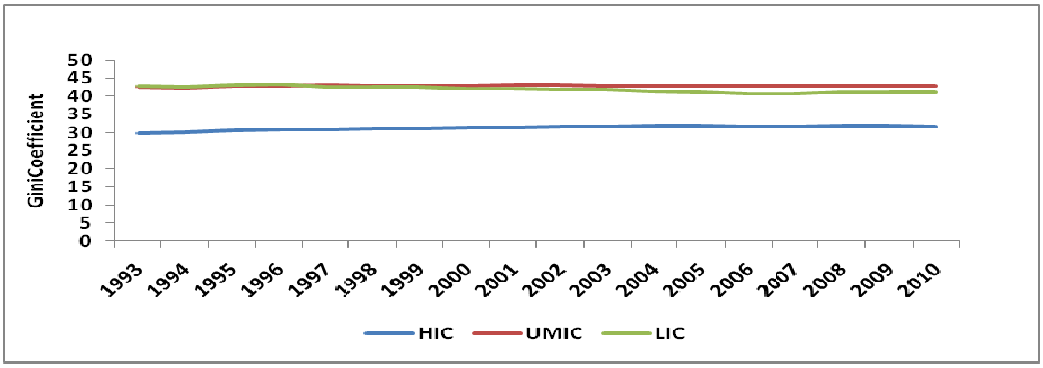
Where C_1,C_2 are the coefficients obtained in the dynamic panel data model regressions (full model) for HIC given in Table A.3 for globalization indicators and control variables and $G\_India_{t_1}$ are the

observed values of globalization indicators for India for the year and are the observed values of the control variables for India for the year .

Results and Discussion

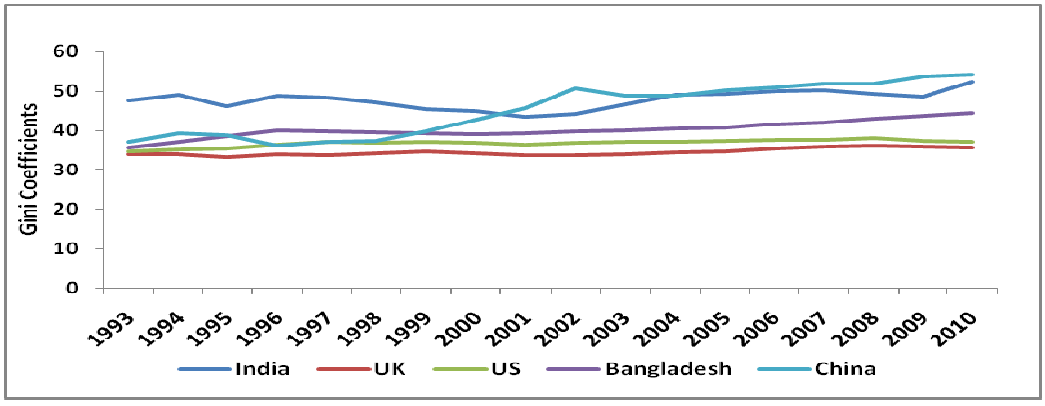
The average of the Gini coefficients by country groups over the period 1993-2012 and the Gini coefficients of some select economies is analyzed. Based on the observed movements of Gini coefficients in Figure 1, inequality is consistently higher in the UMIC and LIC. Figure 2 observes the Gini for some select economies such as UK, USA and China which belong to HIC and UMIC whereas countries like Bangladesh belong to the LIC groups. India, despite belonging to lower-middle income group, has greater income inequality than most economies. Countries characterized by HIC have a lower level of inequality, whereas Bangladesh and China, etc. have a higherstandard of inequality. India has very high level of inequality compared to these countries, though the inequality remains lower than China after the year 2000. Thus, there are significant regional and country differences amongst countries which belong to different income country groups.

Figure 1: Average of Country Gini Coefficients by Income Groups



Source: Author's compilation based on the data obtained from SWIID

Figure 2: Gini Coefficients of Select Economies



Source: Author's compilation based on the data obtained from SWIID

The results of the empirical estimationof the static panel data model are given in Table A.2. The dependent variable of all the regressions is the Gini coefficient. Therefore, a positive coefficient indicates an increase in inequality. The results suggest that globalization indicators are primarily responsible for reducing inequality except for trade openness. Trade Openness has a positive and significant coefficient in most of the categories. For reasons of robustness and endogeneity, the estimation procedure is repeated by the country group with the use of Generalized Method of Moments (GMM) by Arellano and Bond (1991). The results presented in Table A.2 and TableA.3are explained in greater detail below.

The results show that the globalization indicators have a significant impact on income inequality. All the globalization indicators except trade openness increase inequality. Interestingly, trade and FDI have an opposing impact on inequality.

The coefficient of trade is positive and statistically significant for the HIC and UMIC and negative for LIC which implies that trade openness worsens income distribution for the advanced economies but reduces inequality for developing economies. Thus, it is safe to say that more open the economies, more unequal the income distribution is.

FDI has reduced in all the categories of development, but the results differ in the magnitude of the coefficients. The strongest effect of FDI is in the case of UMIC and LIC and the least affected is HIC. Thus, FDI is important for reducing inequality in the developing and least developed economies as it helps in generating employment and boosting economic growth.

ICT also has reduced income inequality in the developing and least developed economies. Education is against the predicted sign in the hypothesis because completion of education at the secondary level may not be enough to find job opportunities in HIC's. They require high skill labor and access to tertiary education helps in finding employment. Since education is measured using gross enrolment ratio at the secondary level, education may not lead to improvement in productivity. Education is also reducing income inequality in the UMIC and is insignificant in the other categories. Financial development measured by domestic credit to private sector has increased inequality. This result is supported by the Jaumotte *et al* (2013) who explain that the benefits of enhanced deepening may accrue to the rich, who have more collateral income.

The benchmark models are given in the static panel data models. The benchmark models provide the best results for every income category. In the case of HICs, there is an improvement in the explanatory powers and significance levels when employment and education are removed from the full model. In the case of LICs, the model without employment and patents gives the best results. Since, employment data is not continuously available especially for LICs, removing the structural change variables would increase the number of observations and also provide results with higher explanatory powers. The R-square is relatively higher for the LIC in the benchmark model, whereas for UMIC and HIC, the explanatory powers have remained the same. The diagnostic tests carried out also show satisfactory results. The Hausman and LM test indicate that most of the models are random effects.

The estimation procedure is repeated with the use of the GMM methods of Arellano and Bond (1991) to address the problems of endogeneity and any dynamic effects. The model is carried out using dynamic panel data approach, and the results are given in Table A.3 below. The effect of past level of

Gini is statistically significant at 1% level with lag 1. Therefore, part of present Gini attributes to its initial conditions significantly. The presence of lagged level of Gini in the explanatory variables increases the magnitude of some of the globalization variables and some control variables.

The results show that trade openness reduced inequality in UMIC and increased it in HIC and LIC. The evidence is supported by Feenstraand Hanson (1997) which says that greater openness raises overall income inequality in all the countries. However,Lundbergand Squire (2003) finds that the effect of openness on income distribution varies as a function of the level of development. Our result is against the predicted signs for LIC and does not confirm to the Stolper-Samuelson theorem which issupported by Anderson (2005) and Çelikand Basdas (2010). FDI is reducing income inequality in all the categories though the magnitude is lowest in LIC. This result goes against the evidence given by Asteriou *et al* (2014) and Jaumotte *et al* (2013). However, it finds support in Sylwester (2005) who finds no evidence that FDI is increasing income inequality within this group of LDCs. ICT has also reduced income inequality in the advanced economies. Industrial employment is also reducing income inequality in the advanced economies. Education is reducing income inequality in the low economies as is shown in the full model.

To gain a deeper insight into how the factors differ in their contribution across the various income categories, we have decomposed data to show the contribution of trade and financial globalization variables based on the final GMM panel regression results. The contribution to the overall annual percentage change of the TFP of each variable was computed as the average annual change in the variable times the regression coefficient of the variable from the GMM. The results of the empirical analysis imply that the primary factors responsible for reducing Gini across the economies are FDI and ICT. Further, Giniis decomposed into the different sub-components of economic globalization and other factors for all the income categories. The results are presented in figures3, 4, 5, for HIC, UMIC, and LIC respectively.

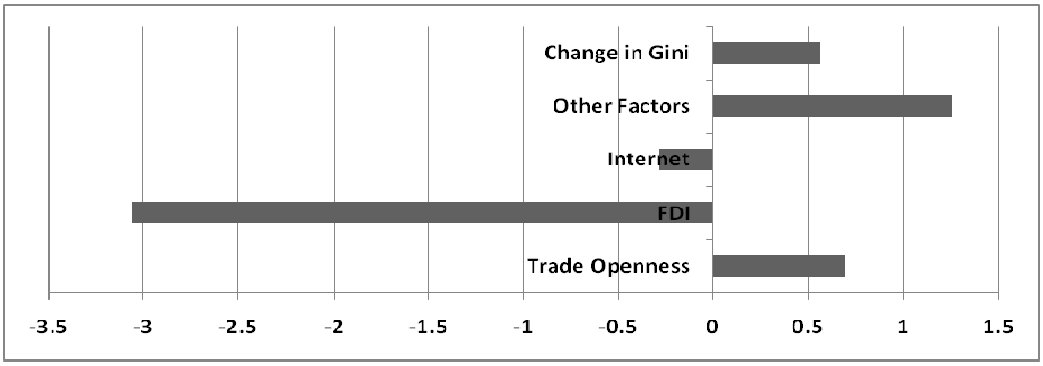
The change in Gini indicates the average percentage change in gini in a year over the given period. It is observed that the change in Ginihas been positive for HIC and UMIC, whereas it is negative for LIC. Thus, the advanced economies have seen an increase in inequality over the years. HIC found the highest increase of .59% on an average per year over the period.In thecase of UMIC, the increase is .26% on an average per year over the period.However, LIC have seen a .12% decrease in inequality on an average per year over the period.Although Gini has fallen in the LIC, the most adverse impact of economic globalization is on advanced economies.

The results show that impact of economic globalization on inequality differs amongst the HIC, UMIC, and LIC. In the advanced regions, globalization has resulted in reducing income inequality whereas, in LIC, globalization hasincreasedinequality.In HIC, globalization is driven by other factors and trade openness whereas FDI and ICT have decreased inequality. In UMIC, trade openness and FDI have reduced inequality whereas, in LIC, FDI alone helps in reducing inequality. Of the three globalization indicators, FDI has contributed the most in reducing inequality in all the three categories. The result of UMIC show that most of the globalization indicators have reduced inequality. Trade openness has the maximum impact amongst the indicators to reduce inequality. In LIC, even though inequality has reduced, it is mostly factors such as education and FDI which have contributed towards it and

globalization has affected inequality adversely. The results are in line with the empirical analysis presented in Table A.3.

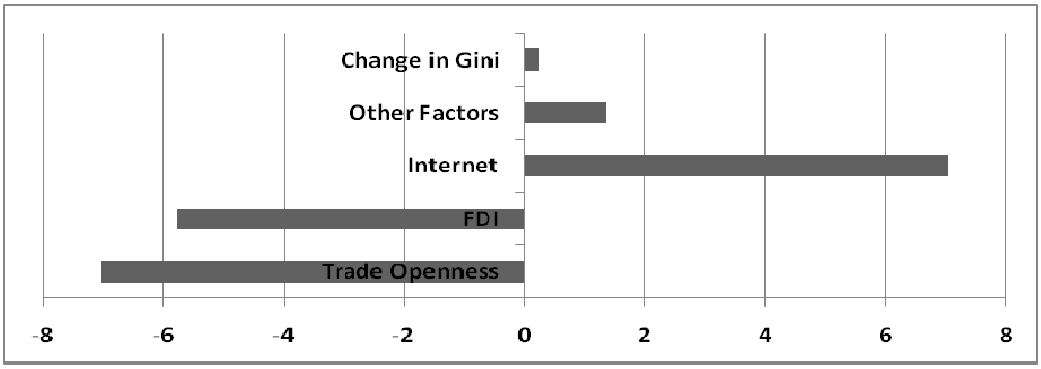
Thus, on the whole, globalization has reduced inequality in advanced economies and increased inequality in LIC. FDI is the only indicator which has consistently decreased inequality in all the three categories. FDI has resulted in the highest reduction in HIC and lowest in LIC. ICT is reducing income inequality in HIC only. HIC have a high proportion of internet amongst the three groups, and UMIC and LIC are gradually catching up. It is also important to note that ICT operates with a lag effect and hence its benefits in developing countries would be experienced in the future.

Figure 3: Decomposition: HIC



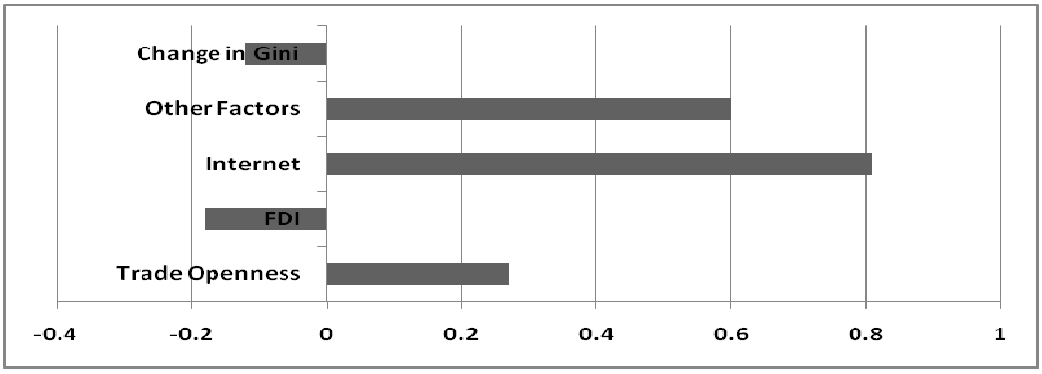
Source: Author's Calculation based on equation (2)

Figure 4: Decomposition: UMIC



Source: Author's Calculation based on equation (2)

Figure 5: Decomposition: LIC



Source: Author's Calculation based on equation (2)

India's Growth Decomposition and Policy Simulation

From the empirical analysis and decomposition exercises carried out above, it can be observed that globalization has reduced income inequality in advanced economies, whereas LIC are adversely affected by globalization. India is positioned as one of the fastest growing economies in the world even though it belongs to the lower middle group. Hence, India can serve as an interesting case to draw policy implications from the advanced economies to help India and other low-income nations reduce its inequality and thus create a sustainable economic growth.

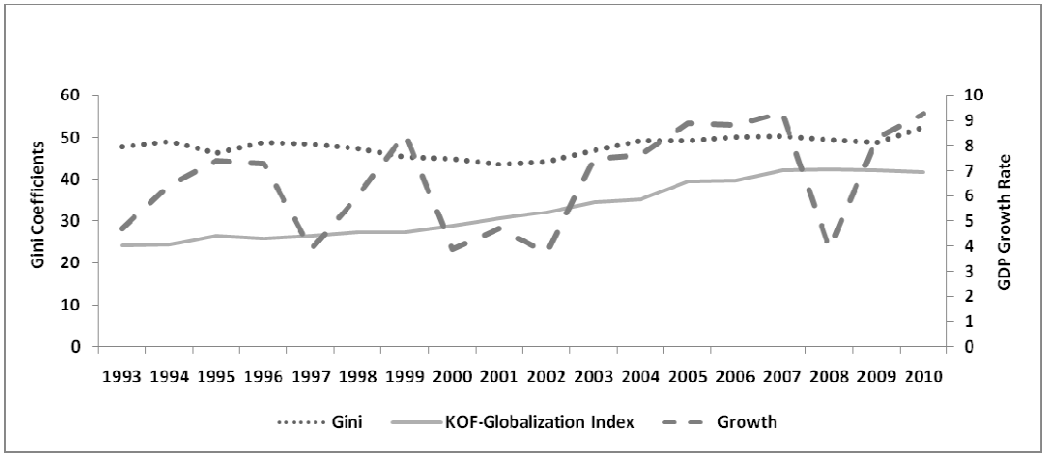
In this section, India's inequality situation is analyzed, and policy simulations are carried out to derive policy lessons from advanced economies which can lead to globalization reducing inequality in India. Firstly, broad trends of India's inequality and growth with globalization are observed. Secondly, inequality decomposition of India is conducted which looks into the contribution of globalization and other factors in income inequality. There is an increase in the inequality of India after adopting the broad-based economic reforms. It is important to see whether the inequality in India is caused by economic globalization or other factors to derive policy lessons for income distribution. Finally, policy simulations are carried out to compare the actual inequality and predicted Gini of India. The predicted Gini is estimated in a two-step process. In the first step, the coefficient of the variable is multiplied by the average of the variables over the income group. The second step involves taking a summation of the product estimated in the first step.

Figure 1 clearly in the previous section clearly shows that the UMIC and LIC have higher income inequality than HIC. Figure 2 shows the countries which belong to different income country groups. Countries such as UK, USA, and China belong to HIC and UMIC whereas countries like Bangladesh belong to the LIC groups. India, which belongs to the low-income group, has greater income inequality than most economies. As can be seen in figure 2, countries characterized by HIC have a lower level of inequality, whereas Bangladesh and China, etc. have a greaterlevel of inequality. India has very high level of inequality compared to these countries, though the inequality remains lower than China after the year 2000.

Figure 6 compares India's integration with the world economy with the economic growth and income inequality. India's globalization, as is given by the KOF globalization index, is compared with the

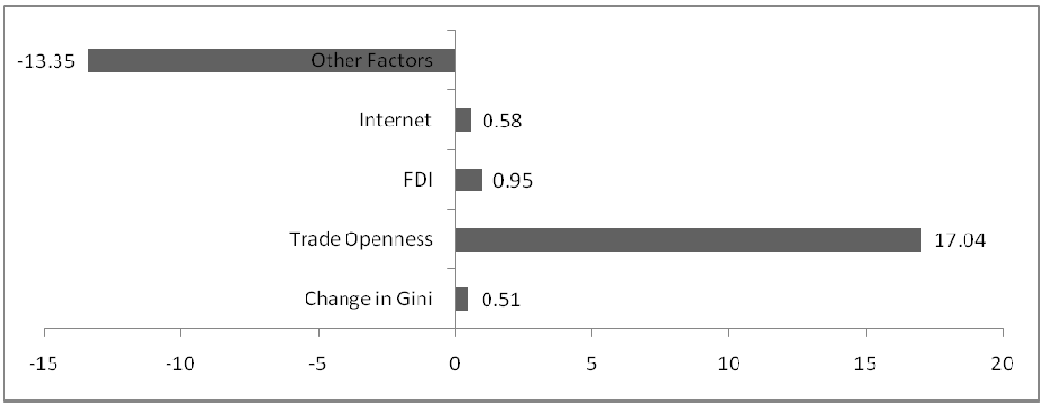
GDP growth rates and Gini coefficient. With an increase in economic globalization, economic growth has increased, and income inequality has decreased.

Figure 6: India's Comparison of Globalization, Growth and Income Inequality



Source: Author's compilation based on the data from WDI and SWIID

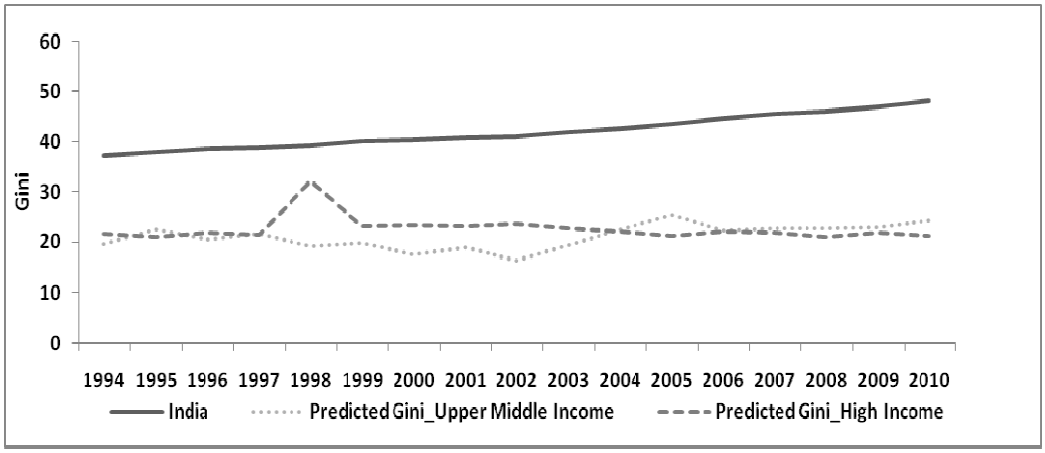
Figure 7: Decomposition: India



Source: Author's Calculation based on equation (2)

Figure 7 shows the inequality decomposition for India. The results indicate that the average annual increase in income inequality in India is 0.51% for India. The graph clearly shows that economic globalization isa primary contributory factor in increasing income inequality. The result is supported by Ezcurra and Rodríguez-Pose (2013) who find that the effect of economic globalization on income distribution depends on the level of development of the countries and degree of the international market in many developing countries still has the potential to grow. Amongst the globalization indicators, trade openness has the highest impact in increasing income inequality. Factors such as education and GDP in other factors group have a negative impact on income inequality.

Figure 8: Policy Simulation for India on Income Inequality



Source: Author's Calculation based on the equation (5)

Policy simulations are carried out to see the inequality effects of economic globalization for India.The coefficient ofglobalization variables is stronger for HIC and UMIC than LIC. In this context, predicting India's Gini coefficient could help in bringing about important policy implications for enhancing India's growth.

Figure 8 shows the policy simulations that are carried out and the actual and predicted Gini of India. Predicted Giniis based on the estimation result of HIC and UMIC as is given in Table A.3. The actualGini refers to the observed Ginicoefficient in India and is indicated as Gini_India in the figure. The predicted Gini coefficient in India relates to the estimated Gini according to the coefficients of HIC and UMIC as is obtained in Table A.3. The predicted Gini in India isknown asGini_HIC and Gini_UMIC respectively.

The results show that Gini coefficient for Indiahas increased over the given period.However, Gini_UMIC and Gini_HIC show that the inequalityfor India is reducing significantlywhich indicates that the inequality for India could decreaseif the globalization effects were as strong as in the case of HIC and UMIC. The predicted values of India according to the high-income coefficients have shown to be lower than actual Gini. Thus, India belonging to thelower middle-income group has fared worse than some of the advanced economies in the period of economic globalization.

The dynamic panel data model estimated above and decomposition of inequalityhighlights the importance of globalizationin reducing income inequality. FDI has the highest coefficient for HIC followed by HICand is minuscule for LIC. The decomposition of Gini results presented above shows that FDI has played a significant role in reducing inequality in the HICand UMIC. Interestingly, the policy simulations carried out above also indicate that inequality is lesser for the economies which have experienced a stronger effect of FDI. Thus, FDI policies in India should be encouraged and implemented in a manner in which the impact of FDI on productivity is maximized.

It can be inferred that thestrategies adopted by the developed economies can help India close the economic gap with advanced nations. The strategies of the rich and advanced economies comprise of both sound economic policies and institutional arrangements. Export-oriented industrialization

strategies are the reason for achieving a high rate of success in many economies, especially in East Asia.Broader access to education will allow LIC to develop necessary skills to absorb the benefits of globalization and would help reduce inequality and poverty at a faster rate.

Conclusion

Theoretically, globalization would make a developing country more egalitarian by raising the wage of its abundant low-income unskilled labor.However, our evidence suggests that low-income regions are the losers and advanced economies are the winners.

To look at the impact of economic globalization on income inequality, a panel data approach is used for the period 1993-2012for 115 economies. This is followed by decomposition exercises and policy simulations for evaluating the impact of economic globalization on income inequality.

Using a reliable data set suggests that the rise in income inequality across the various categories of development is primarily attributable to economic globalization. While trade has increased income inequality in the HIC and LIC, FDI continues to reduce income inequality.

The decomposition exercises indicate that low-income economies have the greatest adverse impact of economic globalization on income inequality. Our findings also suggest that except low-income economies, all other economies are reaping the benefits of globalization to some extent. FDI has far-reaching effects of reducing income inequality in all the categories, though the magnitude is very marginal in the low-income economies. FDI contributes more in developed countries which have the technical absorptive capability and the desired level of human capital. The policy simulations indicate that globalization has worsened income distribution and India, belonging to the low-income category of economies, can fare better if we adopt the strategies of advanced economies.

Notes

[i] The KOF Index of Globalisation is an index of the degree of globalisation of 122 countries. It was conceived by Axel Dreher at the Konjunkturforschungsstelle of ETH Zurich, in Switzerland.

[ii] Kearney, A T (2003) explain the A.T. Kearney/Foreign Policy Magazine Globalization Index makes use of several indicators spanning information technology , finance, trade, personal communication, politics, and travel to determine a country's ranking. They provide a multifaceted view of a country's level of global integration by combining these indicators into four subcategories: economic integration, technology, personal contact, and political engagement.

[iii] The Stolper-Samuelson theorem asserts an increase in the domestic price of a commodity, brought about by a higher tariff or additional protection, will raise the price of the factor of production that is used relatively intensively in producing the commodity (Stolper and Samuelson 1941).

[iv] For estimating system GMM, we use the xtabond2 package in STATA developed by (Roodman, 2006).

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Appendix

Table A.1: Sample of Countries

HIC	UMIC	LIC
Australia	Albania	Armenia
Austria	Argentina	Bangladesh
Belgium	Azerbaijan	Bolivia
Canada	Belarus	Burkina Faso
Chile	Brazil	Cambodia
Croatia	Bulgaria	Cameroon
Cyprus	China	Cote d'Ivoire
Czech Republic	Colombia	Egypt, Arab Rep.
Denmark	Costa Rica	El Salvador
Estonia	Dominican Republic	Ethiopia
Finland	Ecuador	Guatemala
France	Hungary	Honduras
Germany	Kazakhstan	India
Greece	Macedonia, FYR	Indonesia
Hong Kong SAR, China	Malaysia	Kenya
Iceland	Mauritius	Kyrgyz Republic
Ireland	Mexico	Lao PDR
Israel	Namibia	Lesotho
Italy	Panama	Madagascar
Japan	Peru	Malawi
Korea, Rep.	Romania	Mali
Latvia	South Africa	Mauritania
Lithuania	Thailand	Moldova
Luxembourg	Tunisia	Mongolia
Malta	Turkey	Morocco
Netherlands	Venezuela, RB	Mozambique
New Zealand		Nepal
Norway		Nicaragua
Poland		Pakistan
Portugal		Paraguay
Russian Federation		Philippines
Singapore		Senegal
Slovak Republic		Sierra Leone
Slovenia		Sri Lanka
Spain		Swaziland
Sweden		Tajikistan
Switzerland		Tanzania
Trinidad and Tobago		Uganda
United Kingdom		Ukraine
United States		Vietnam
Uruguay		Zambia
		Zimbabwe

Table A.2: Estimation Results of Static Panel Data

Model No	2.1	2.2	2.3	2.4	2.5	2.6
	Dependent Variable: Gini					
	Full Models			Benchmark Models		
	HIC	UMIC	LIC	HIC	UMIC	LIC
	RE	FE	RE	RE	FE	FE
Trade Openness	0.659(.92)	5.663***(3.17)	0.41(.16)	1.413**(2.36)	5.062***(3.64)	-0.924***(-2.94)
FDI	-0.003(-0.15)	-0.109***(-2.93)	-0.07(-1.44)	-0.011*(-1.68)	-0.098***(-2.84)	-0.013***(-2.65)
Internet	0.022***(3.24)	-0.056**(-2.02)	0.23	0.040***(6.84)	-0.065***(-3.03)	-0.106**(-2.42)
Patent	-0.055(-0.46)	0.315(1.05)	0.21(.52)	0.097(.88)		
DCP	-0.001(-0.32)	0.050***(2.9)	0.03(1.15)	-0.001(-0.23)	0.046***(3.12)	0.074***(3.62)
Agricultural Employment	0.026(.35)	-0.146***(2.94)	0.1(1.47)		-0.165***(-4.30)	
Industrial Employment	-0.293***(-5.28)	-0.104(-0.64)	0.24(1.23)		-0.252**(-2.29)	
Education	0.028**(2.17)	-0.143***(-3.83)	0.02(.33)		-0.095***(-3.64)	0(.10)
GDP per capita	40.541***(4.97)	1.215(.74)	-8.02(-0.25)	39.535***(5.85)	0.497(.37)	14.39(-1.22)
GDP per capita Squared	-2.222***(-5.20)	0.006(.21)	0.84(.36)	-2.173***(-5.94)	0.019(.72)	-1.2(-1.36)
Constant	-131.830***(-3.39)	43.121***(3.59)	47.12(.43)	-134.053***(-4.26)	52.359***(5.23)	2.14(.05)
Adjusted R-Square	0.16	0.27	0.155	0.184	0.28	0.14
No. of Observations	573	232	127.00	667	317	389.00
Hausman Test	0.63	0.04	0.1665	0.1278	0.0132	0.04
LM Test	0	0	0	0	0	0

Note: 1.Figures in parentheses indicates t –values based on robust standard errors. ***/**/* indicate significance at 1%, 5%, 10% respectively.

2. RE and FE indicate random effect and fixed effect model respectively.

Source: Author's Calculation based on equation (3)

Table A.3: Estimation Results of Dynamic Panel Data

Model No	3.1	3.2	3.3	3.4	3.5	3.6
	Dependent Variable: Gini					
	Full Models			Benchmark Models		
	HIC	UMIC	LIC	HIC	UMIC	LIC
L.Gini	1.019***(6.81)	-0.245(-0.62)	0.577***(3.53)	0.985***(10.18)	0.631***(2.87)	0.850***(4.01)
Trade Openness	0.039(.18)	-8.334**(-2.50)	2.54(1.08)	0.248*(1.79)	-2.73*(-1.94)	0.06*(1.83)
FDI	-0.022(-1.04)	-0.11(-1.61)	0.05(1.22)	-0.025*(-1.74)	-0.082**(-2.53)	-0.002**(2.54)
Internet	0.00855	0.1719	0.01(.12)	-0.007***(-2.97)	-0.081***(-4.25)	0.01(.31)
Patent	-0.031(-1.04)	-0.004(-0.01)	0.12(.61)	-0.015(-0.51)		
DCP	0.004**(2.15)	0.121**(2.82)	0.02(.99)	0.004**(2.53)	0.045*(1.77)	0.034*(1.88)
Agricultural Employment	0.008(.18)	-0.320**(-2.28)	-0.06(-0.78)	0.004(.12)	-0.066(-1.50)	
Industrial Employment	-0.004(-0.05)	-0.382**(-2.21)	-0.3(-1.40)	-0.022*(-1.85)	'-0.175*(-1.71)	
Education	0.004(-.64)	0.3956	-0.094**(-2.29)			-0.02(-0.55)
GDP per capita	-6.257(-0.95)	6.760**(2.63)	-2.99(-0.17)	-4.43*(-1.86)	2.05(1.01)	2.54(.37)
GDP per capita Squared	0.311(.87)	-0.045(-1.06)	0.35(.26)	0.213*(1.72)	0.004(.042)	-0.17(.38)
Constant	30.36(1.31)	37.408(1.25)	32.5(.52)	24.25*(1.85)	5.491(.52)	-2.49(-.15)
F Statistic	213.62	17.35	88.13	236.26	331.8	161.74
No. of Obs.	550	223	125.00	616	367	385.00
AR(2)	0.217	0.635	0.57	0.164	0.544	0.55
Hansen	0.406	0.451	0.88	0.406	0.515	0.87
No of Instruments	13	14	14.00	15	18	13.00
No of Groups	39	21	18.00	40	28	42.00

Note: Figures in parentheses indicate t –values based on robust standard errors. ***/**/* indicate significance at 1%, 5%, 10% respectively.

Source: Author's Calculation based on equation (4)

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