tPakistan Journal of Applied Economics, Vol. 24 No. 1, (39-73), Summer 2014

INEQUALITY, TRADE AND ECONOMIC DEVELOPMENT: Evidence from Developing Countries

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This study analyses the impact of trade on within-country inequality using a panel data set from 65 developing countries [see, Appendix (Table A-2)]. This study differs from the existing literature on distributional impact of trade by explicitly noting the importance of development stage in shaping the link. The analysis shows that the effect of trade on inequality depends upon the level of GDP-per-person (to some extent a proxy for economic development) of the trade-integrating economy. Among the developing economies, those with a high level of GDP-per-person enjoy a favourable effect of trade openness on income distribution, while the impact is unfavourable for those with low GDP-per-person. In sum, trade does not accentuate ameliorates inequality in developing countries with the low level of economic development - the opposite of the prediction of standard economics [Heckscher-Ohlin (HO) Model]. The HO model implies that free trade between labour-intensive (developing) and capital-intensive (developed) countries should lead to more specialization in labour-intensive products in developing and capital-intensive products in developed countries. This should bid up the price of labour, relative to capital in developing countries, and vice versa in developed countries, increasing inequality in developed countries and decreasing it in developing countries. The Stolper-Samuelson theorem has similar consequences. Findings of the study are robust to the sensitivity analysis, different estimators, inclusion of regional and time effects.

I. Introduction

This paper studies the relationship between increasing openness to trade and within-country inequality. Inequality has increased substantially all over the world

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The authors are extremely thankful to the anonymous reviewer for his/her valuable input to improve quality of this manuscript. The comments on pitfalls of cross-country regressions, sug-gested remedies and suggested studies were much helpful to develop the deep theoretical and empirical insights for this manuscript, as well as, for future research. Theoretical queries and recommendation of studies helped a lot to improve the literature review section of this paper. A deep look on pre-estimation tests, reported results, techniques helped a lot to improve the results section. In nutshells, the whole paper has been substantially improved and I have learned a lot during the revision process. It is worth high appreciations that the referee reviewed this manuscript two times and seems to spend a considerable time in evaluating it. I am also thankful to reviewer for making correction in many places in the paper. Last but not least, it is to acknowledge that the editor and the editorial office have been very cooperative and efficient to accomplish this task. The suggestions and comments from the editorial office also helped to improve the quality of this paper. All errors and omissions belong to the authors.

during the last three decades.[1] The inequality is increasing both within and among countries. Similarly, in recent decades, globalization has also increased substantially - whether measured in trade flows, FDI, capital flows, or off-shoring - in both developed and developing countries.

These parallel developments have led to a natural conjecture that in-creasing inequality is a result of increasing trade, and therefore, now increasing globalization is considered as one of the reasons for the increasing trend of inequality. Until the 1990s, the main theoretical framework to explain the relationship between trade and inequality was the Hecksher-Ohlin (HO) model. In its simplest form, the HO model predicts that abundant factors have more return in an open economy; in developed countries it is skilled labour and capital which will benefit more from trade opening, and in developing countries it is unskilled labour.

A number of studies have shown that inequality has increased in developing countries as a result of trade reforms]see Berman et al. (1994), Autor et al. (1998), Hanson and Harrison (1999) and others]. Such a positive impact of increasing trade on inequality has undermined the simple theoretical predictions of the HO model. In other words, increasing inequality with increasing globalization was at odds with simple predictions of the HO model.

These findings led researchers to explore for other causes of increasing inequality. One main explanation is skilled-biased technology, which implies that changes in technology are biased towards skilled workers. Some other explanations are the weakening of labour unions, unequal access to schooling, and immigration [Freeman (2004)].

Wood (1994) shows that a 3-factor model with labour, capital and above-basic education:

a) works better than a two-factor model,
b) substantially changes HO predictions,
c) but HO is right that trade opening with poor countries raises inequality within rich countries.

Overall, most economists were sceptical of assigning central importance to trade as main cause of increasing inequality [Freeman (2004), Harrison, McLaren and McMillan (2011)].

The literature was also at odds with respect to existing trade theories. This led to new theories which focus on heterogeneous firms, labour market frictions and

[1] It is noteworthy that between-country inequality (inter country Gini of mean incomes) has declined sharply, especially if population-weighted (due to gains in India, China, Indonesia among others). However, within-country inequality (Gini) has risen sharply in most countries, especially in populous ones. The net effect: interpersonal world Gini has changed very little [see, Milanovic (2011)].

incomplete contracts. These new theories provide insights into the effects of trade on income inequality. There are number of ways through which trade might contribute to inequality. However, this paper mainly focuses on the possibility that it is development itself (roughly proxied by mean GDP) that determines the impact of trade on inequality.

In the literature, the role of trade in explaining inequality is mainly generalized for all developing countries. However, developing countries at different levels of economic development differ in capacity to spread it to their poorer populations, the employment and consumption gains from free trade. The countries at lower level of economic development have, for example, weak trade unions, labour market frictions, and unequal access to schooling compared to developing countries with higher GDP-per-person.

The authors focus trade as main cause of inequality but differentiate between low-income and high-income developing countries. It is argue that the impact of trade on inequality can vary depending upon the level of economic development for following reasons. First, countries at lower level of economic development lack domestic conditions which help poor to take advantage of more open trade. Second, in trade-integrating economies, markets such as labour and financial market are comparatively underdeveloped. The better domestic markets help poor to take the advantage of increasing trade.

The importance of economic development in shaping the link between trade and inequality is also focused in the study. In other words, this study attempts to investigate whether the inequality impact of trade depends on the level of economic development. Attempts have been made to answer the following questions: First, what is the impact of trade on inequality within developing countries? Second, does the inequality impact of trade vary depending upon different levels of development in developing countries?

The HO model says that impact of more open trade on within-country Gini varies between developing and developed countries. This effect changes from inequality-reducing to inequality-increasing. The critics of HO model say that either there is no causality between more open trade and changing the impact of trade on within-country Gini between developing and developed countries or the impact is opposite. Our model says that rising openness to trade leads to fall within-country Gini only in high-middle income countries that is shifting from positive (inequality-increasing) to negative (inequality-decreasing).

The rest of the discussion is structured as follows: Section II provides a review of the related literature and theory on the predictors of inequality. Section III presents methodology for the study. Section IV provides a discussion on data and estimation procedure. Section V puts forward the results derived from the research questions and a discussion on these results. Finally, Section VI concludes and provides policy implications.

II. Literature Review

The Heckscher-Ohlin (HO) model, in its simplest form, predicts that a nation specializes in a product requires an intensive use of its abundant factors of production. Since developing countries are abundant with low-skilled labour, they specialize in labour intensive products. The demand and wages for low-skilled labour tend to increase during the process of products specialization based on labour intensive production techniques. Thus, more employment per person – and, at or near full employment, increasing wage-rates relative to profit rates - help to narrow down the existing inequality gap.

Nevertheless, predicted lower inequality by the HO model depends on the assumption of similar technologies across countries. If this assumption is dropped – and if more openness to trade also brings more technology diffusion from developed nations to developing nations – then such diffusion generates a skill premium. Therefore, the demand, and hence employment and wage-rates, for high skilled labour tend to increase relative to those for unskilled labour. This raises overall within-country inequality, counteracting the prediction of the HO model: wage gaps tend to widen as a developing country becomes more open to trade [see, for example, Berman et al. (1994), Autor et al. (1998), Feenstra and Hanson (1996), (1997)]. They propose a model where there is a continuum of goods ordered along a ladder whose steps are characterized by different levels of skill intensity. Trade liberalization would shift the production of intermediate inputs (through trade and foreign direct investment) from developed to developing countries.[2]

While such products would be characterized as unskilled labor-intensive from a developed country's perspective, they appear to be skilled-labor-intensive from a developing country's point of view. In this way, average skill intensity, and therefore, the demand for skilled labor increase both in the North and in the South, inducing a rise in the skill premium in both areas. Zhu and Trefler (2005) had extended Feenstra and Hanson's model to a case without foreign direct investment but with a Ricardian source of comparative advantage added to that based on the factor endowment. In their model, technological catch-up by the developing country, causes a shift in the production of the least skill-intensive Northern goods to Southern countries, where they become the most skill-intensive goods produced, thus leading to a rise in the demand for skilled labor in both the developed and developing countries. Therefore, more trade raises inequality in all countries – "except that trade lowers inequality in high-middle income countries."

In the literature, many other studies note the skill-enhancing role of trade through upgrading technologies in the developing world. For example, Barba et al.

[2]However, this can be countered by both labour markets and public action with few barriers to labour absorption, adaptation and mobility, (a) entrepreneurs select unskilled-labour-intensive technologies, (b) unskilled workers, especially in a young labour force, acquire skills.

(2002) note that increasing imports allow a developing economy to upgrade its technology through the imports of mature and second-hand capital goods. Acemoglu (2003) also argues that trade openness leads to technical upgrading by allowing a rise in the international flows of capital goods. When the modern skill intensive technologies were rapidly adopted by South, demand and wages of skilled labour increased; that, in turn, increased inequalities in developing countries. Since unskilled labour also acquire the skills in this process, the within-country Gini is also likely to fall. Our results show that this happens in developing countries with high income levels.

Technological upgrading in developing countries, not only helps in having better access in the markets of developed countries but also saves the sunk costs of technological innovations. A study by Gerschenkron (1962) points out that a lagged developing country directly jumps on relatively new technology and hence exploits the benefits of late comer. A study by Perkins and Neumayer (2005) also supports this argument.

In an open economy, to have a better access in the markets of developed countries, exports also create incentives for replacement of outdated technologies. Yeaple (2005) shows that exports based on updated technologies yield high profits.

In a case study of Mexico, Hanson and Harrison (1999) observe that firms demand more white collar workers in exporting sectors as compared to non-exporting sectors of production. Therefore, increasing exports widen inequalities. Moreover, Berman and Machin (2004) confirm this positive association between exports and inequality for developing countries. They find a monotonic relationship between trade and inequality which is consistent with the HO model and inconsistent with our findings. However, in a recent study, Majeed (2010) argues that trade accentuate and not ameliorate inequality in the case of Pakistan which is inconsistent with the HO model. These studies build a positive link between exports and inequality but do not link trade to economic development. This study fills the gap by developing a link between trade, development and inequality for developing countries.

1. Theory of Inequality Determinants

Before analysing trade as a cause of within-country inequality, some other suggested causes are considered. The most important may be the economic development itself. Kuznets (1955) discussed the process of population shift from traditional to modern activities as basis for the theory of distributional change during the course of development. The author argued that income distribution within a country was likely to vary over- time with its progress from a poor agricultural society to a rich industrial society. The average per capita income of a rural population is usually lower than that of an urban population, whereas income distribution within the urban population is more unequal. In the urban pop-

ulation, savings are concentrated in the upper-income groups and the cumulative effects of such savings would be the concentration of an increasing proportion of income yielding assets in the upper-income groups. Thus, as the weight of urban sector in the economy increases with industrialization, the country's overall income distribution will tend to deteriorate until such time when the urban sector dominates. Thereafter, the income distribution will tend to stabilize because of three factors: (i) the slower growth in the population of the wealthier classes,[3] (ii) the exploitation of the opportunities for wealth-creation offered by technology undertaken by those whose assets are not in established industries, and (iii) the shift of workers, away from lower-income to the higher-income industries.

The literature during the 1960s and 1970s in general, supported the hypothesis that income inequality has an inverse-U relationship to the level of per capita income. For example, Ahluwalie (1976) supported the Kuznets's point of view. However, the great weight of recent empirical studies challenged this hypothesis, finding no significant relationship between inequality and per capita income. They argue that while the Kuznets Curve, perhaps sometimes describing a cross section of countries at a point in time, does not describe the evolution of inequality over time within countries. For example, Anand and Kanbur (1993) estimate functional forms for inequality-development relationship using cross-section data on 60 developing and developed countries, and reject the Kuznets hypothesis, as do Li, and Zou (1998).

Alternative explanations for the evolution of inequality in developing countries have been tested:

- The role and importance of *financial development* in reducing income inequality can be traced back to the earlier theoretical studies of Galor and Zeira (1993) and Banerjee and Newman (1993). These studies show inequality-narrowing effect of financial development, [Lamoreaux (1986), Haber (1991)]. On the other hand, Maurer and Haber (2003) argued that at an early stage of financial deepening access to financial services is limited to incumbents and will thus raise their income relevant to income of poor. Nevertheless, Greenwood and Jovnovie (1990) predicted an inverted U-shaped relationship between financial development and income inequality. They show that initially financial development favors rich, thereby increasing inequalities. However, over time at higher levels of financial development, poor also benefit when more people have access to financial system.

[3]However, this effect is not clear because lower share of people on very high incomes may indicate lower supply of skills; if they are demand-inelastic, income going to these (fewer) people rises.

- The effect of *inflation* on inequality is uncertain. It can increase inequalities through its effect on individual income and can reduce inequalities in the presence of progressive tax system. The inequality widening effect of inflation is more pronounced when wages fail to chase the increasing price levels. In developing countries, trade unions are weak and minimum wage laws are dysfunctional in the presence of weak institutions. Thus, workers are left with less or no rise in wages, while owners of the firms enjoy benefits of rising prices and get further rich [MacDonald and Majeed (2010)].

- The role of *government* in affecting income inequality is critical. The literature does not show consensus on relationship between government spending and inequality. Government spending might help in ameliorating inequality if its revenues collected through taxes and transfer systems are redistributed in favor of the poor. Papanek and Kyn (1986) test the impact of government intervention on inequality but results of their study do not support the contention that government spending reduces inequality. They argue that government intervention often benefit the elite such as the political, bureaucratic and military leadership, rather than the poor. However, some cross-country studies [Stock (1978), Boyd (1998), MacDonald and Majeed (2010)] find the inequality reducing effect of government spending.

- It is widely believed that higher *population growth* is associated with higher income inequality. Malthus (1803) argued that it raised food prices, lowered money wages and raised the dependency burden. The recent census evidence shows that this is higher for the poor. Deaton and Paxson (1997) argue that population growth increases the size of families in the poor stratum, thereby increasing dependency burden and inequality. Using the cross-national regressions, Eastwood and Lipton (1999) point out that higher fertility increases poverty, both by retarding economic growth and by skewing distribution against the poor. Eastwood and Lipton (2001) find a considerable effect of population on poverty: 'the average (developing) country in 1980 had a poverty incidence of 18.9 per cent; had it reduced its fertility by 5 per 1000 throughout the 1980s (as did many Asian countries), this figure would have been reduced to 12.6 per cent.[4] Ahlburg and Cassen (2008) argue that the source of population change and timing of the measurement of association between population and poverty also matter. If family size increases because of a birth, poverty may rise because more mouths are trying to consume the same amount of resources. The death of an adult may increase the likelihood of the family becoming poor unless there are offsetting factors such as increased resources flowing in from relatives

[4]Eastwood and Lipton (2001), p.218

or increased work by other family members. Finally, investment in human capital can be expected to reduce income gaps as higher education improves skills, productivity and labour income.

III. The Methodology

This section discusses an empirical model to estimate the relationship between inequality and trade. In the literature, many studies have modelled Kuznets hypothesis to estimate the inequality determinants. For example, Randolph and Lot (1993), Ram (1995) and Iradian (2005) have modelled inequality as follows:

$$\log Gini_{it} = \alpha_{it} + \gamma_1 \log Y_{it} + \gamma_2 \log Y^2_{it} + X_{it} + \varepsilon_{it} \quad (1)$$
$$(i = 1, \ldots \ldots \ldots N;\ t=1, \ldots \ldots \ldots T)$$

$Log\ Gini_{it}$ = natural logarithm of the Gini Index,
$Log\ Y_{it}$ = natural logarithm of income per capita, adjusted with PPP,
$Log\ Y^2_{it}$ = square term controls nonlinear relationship between economic development and inequality,
X_{it} = row vector for control variables,
ε_{it} = disturbance term.

Equation (1) is conventionally used to test for the Kuznets hypotheses. The expected signs for γ_1 and γ_2 are positive and negative, respectively. Following the suggestions of Barro (2000) and others, Equation (2) includes openness to trade [measured as (M+X)/GDP)], which is main focus of this study.

$$\log Gini_{it} = \alpha_{it} + \gamma_1 \log Y_{it} + \gamma_2 \log Y^2_{it} + \gamma_3 [Trade_{it}/Y] + X_{it} + \varepsilon_{it} \quad (2)$$

According to the Stolper-Samuelson theorem the expected sign for γ_3 depends on comparative advantage of an economy relative to its trading partners.

$$\log Gini_{it} = \alpha_{it} + \gamma_1 \log Y_{it} + \gamma_2 \log Y^2_{it} + \gamma_3 [Trade_{it}/Y] + \gamma_4 [Trade_{it} * Development_{it}/Y] + X_{it} + \varepsilon_{it} \quad (3)$$

Equation (3) introduces an interactive term for trade and economic development to assess whether the effect of trade varies depending upon the level of economic development. In this study, per capita income (PCY) is used to measure the level of economic development. It is important to note that there are familiar problems with this proxy. Two of these are: (a) mineral economies are different, i.e., high (or rising) mineral-based GDP often goes with little or no improvement in other signs

of development or even fall in mass poverty; (b) Sub-Saharan Africa GDP data are very weak – it has been tested whether findings of this study are affected by excluding the sub-Saharan African countries.

Cross-country inequality variation depends on other factors such as the government size, education and population growth. Higher targeted government spending could reduce inequalities, to the extent that rent seeking activities are avoided and the government spending enhances possibilities and opportunities for the poor [see Stock (1978), Boyd, (1998), Iradian, (2005)]. A rise in human capital can be expected to narrow down the gap between poor and rich as people with high investment in human capital have less chances to fall in poverty trap. A better proxy for this could be government spending on health and education, however, in this analysis, the government spending at aggregate level is mainly focused. Equation (3) can be rewritten as:

$$\log Gini_{it} = \alpha_{it} + \gamma_1 \log Y_{it} + \gamma_2 \log Y^2_{it} + \gamma_3 [Trade_{it}/Y] + \gamma_4 [Trade_{it} * Development_{it}/Y] + \gamma_5 \log G_{it} + \gamma_6 \log HK_{it} + \gamma_7 \Delta Pop_{it} + \varepsilon_{it} \quad (4)$$

G_{it} = natural log of government spending as proxy for government spending on social sector,

HK_{it} = measured as secondary school enrolment rate,

ΔPop_{it} = percentage change in total population over the given household survey year.

IV. Data and Estimation Procedure

The income inequality data may not be comparable across countries due to differences in definitions and methodologies. This study uses Gini coefficient to measure income inequality, which is one of the most popular representations of income inequality. It is based on Lorenz Curve, which plots the share of population against the share of income received and has a minimum value of zero (case of perfect equality) and maximum value of one (perfect inequality).

The data set is a mixture of Ginis of (a) per-person (occasionally per-adult-equivalent): per-household and per-tax-unit (per-person Ginis are lower, often 10-20 per cent lower than per-household or per-tax-unit Ginis). Per-adult-equivalent Ginis are lowest; (b) consumption and income: consumption Ginis are lower, often by 15-25 per cent. However, this does not matter in this study given the fact that panel data appear to reduce the problem via first-differencing. Despite that, there will be specification error and loss of information if Ginis with quite different referents are entered uncorrected as if they were comparable. Also, bias may be introduced, e.g., if higher-income developing-country Ginis are likelier to be measured on a consumption-per-person basis: costlier to collect and process, but better.

In this study Gini coefficients which are of high quality and consistent over time are used. However, Ginis, the most popular inequality measure, have problems familiar to the literature. Alternatively: Theil l, Theil t, and ratio of top to bottom decile (or quintile) in mean income or consumption per person also have problems. All inequality measures are under-estimates, because the poorest and richest, for different reasons, are grossly under-represented in the household surveys.

Having explained these problems, later work which might resolve them by using alternative measures of inequality is suggested. To address the problem of inconsistency resulting from the use of Gini coefficients based on expenditure and income, included a dummy variable with a value of one for inequality observations that are based on consumption and zero otherwise was included.

Iradian (2005) introduces the idea of a comparable cross country data series and the study closely follows this approach by extending the data set for different variables for a longer period. To make the data more comparable, this study takes data

TABLE 1

Data Sources and Variables Definition

Variables	Definitions	Sources
Per capita real GDP	GNP per capita adjusted with purchasing power parity (PPP).	[1]
Gini coefficient	It is a measure of income inequality based on Lorenz curve.	[3] & [4]
Secondary school Enrolment	The secondary school enrolment as % of age group is at the beginning of the period. It is used as a proxy of investment in human capital.	[1]
Inflation	Inflation rates, calculated from consumed price index.	[2]
Private credit	It represents claims on the non-financial private sector as % of GDP.	[2]
Government expend.	Government expenditures as share of GDP.	[2]
Population	Population growth rates.	[1]
M2	It represents broad money as % of GDP.	[2]
Trade openness	It is the sum of exports and imports as a share of GDP.	[1]
Remittances	International migrants' remittances as % of GDP.	[1]
FDI	Foreign direct investment as % of GDP.	[1]
Financial Intermediation (FI)	The level of Financial Intermediation is determined by adding M2 and credit to private sector as % of GDP.	[2]

Sources: (1) World Bank, World Development Indicators online data base, 2009; (2) International Financial Statistics online data base, 2009; (3) UNDP (2008); (4) Iradian (2005).

on variables in the form of averages between each pair of two successive survey years. A panel data for 65 developing countries for the period 1970 to 2008 has been assembled. The minimum and maximum number of observations for each country is three and nine respectively. However there are very few countries with minimum observation. All averages are based on averaging of successive survey years.

1. Estimation Technique

The estimation procedure for the inequality model is discussed now. The use of pooled time-series and cross-section data provide large sample that is expected to yield efficient parameter estimates. Ordinary Least Squares (OLS) has a problem of omitted variable bias. If region, country or some group specific factors affect inequality, explanatory variables would capture the effects of these factors and estimates would not represent the true effect of explanatory variables.

This analysis is based on Two Stage Least Square (2SLS), technique of estimation. This technique addresses the issue of endogeniety which is covariance between the independent variables. The error term is not equal to zero and also addresses the problem of omitted variables bias. The alternative econometric techniques such as Limited Information Maximum Likelihood (LIML) and Generalized Methods of Moments (GMM) are also used.

In this study, the main focus is made on the Generalized Method of Moments (GMM) estimation technique that has been developed for dynamic panel data analysis [Holtz-Eakin et al. (1990), Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998)]. GMM controls for endogeneity of all explanatory variables, allows for the inclusion of lagged dependent variables as regressors and accounts for unobserved country-specific effects. For GMM estimation, sufficient instruments are required. Following the standard convention in literature; the equations are estimated by using lagged first difference as instrument.

2. Data Diagnostic Tests

If a regression model is not specified correctly, it may lead to unbiased and inefficient results which may leave us with incorrect analysis of the data. We have applied the following data diagnostic tests:

a) Model Specification Test

To check correct specification of the basic model [Equation (3) and (4)], the LINK test and Ramsey Regression Equation Specification Error Test (RESET) test are applied. Since P-values > 0.05 of the squared terms in the LINK test and for Ramsey RESET test, it is inferred that our models are specified correctly.

TABLE 2(a)

Link Test for Equation (3)

Dependent Variable- Inequality	Coefficients	Std. Err.	T-stats	Prob. Value>t
Hat	-7.270323	4.3826680	-1.66	0.098
Hat-square	1.156941	0.6129198	1.89	0.060
Constant	14.750240	7.8238460	1.89	0.060

TABLE 2(b)

Ramsey RESET Test for Equation (3)

Ramsey RESET test using powers of the fitted values of dependent variable (inequality)
Ho: model has no omitted variables
F(3, 328) = 1.4000
Prob > F = 0.2417

TABLE 2(c)

Link Test for Equation (4)

Dependent Variable- Inequality	Coefficients	Std. Err.	T-stats	Prob. Value>t
Hat	-1.1971790	2.4129270	-0.50	0.620
Hat-square	0.3010419	0.3304999	0.91	0.363
Constant	3.9996620	4.3966750	0.91	0.364

TABLE 2(d)

Ramsey RESET Test for Equation (4)

Ramsey RESET test using powers of the fitted values of dependent variable (inequality)
Ho: model has no omitted variables
F(3, 259) = 3.0500
Prob > F = 0.0291

b) Multicollinearity Test

In order to check the multicollinearity the Variance Inflation Factor (VIF) test is applied. VIF is equal to the invese of 1- R^2 VIF= $(1)/(1-R^2)$. It can be observed in Table 3 that there is no evidence of multicolliniarity because for all independent variables and their mean value, the VIF is fairly small.

c) Normality Test

Normality tests are used to determine whether data set have normal distribution and to determine whether the random variable underlying the model is distributed normally. In order to check the normality of the residuals obtained from Equations (3) and (4), Shapiro-Wilk test of normality is applied. The null hypothesis is that residuals are distributed normally. The probability values of the Shapiro-Wilk test is looked and the null hypothesis that residuals are normally distributed at 1 per cent level of significance is accepted.

TABLE 3

Multicolliniarity Tests

Variable	VIF	1 / VIF
Human Capital	3.32	0.301328
Population	2.62	0.381115
GDP per Capita	2.18	0.457779
Trade Openness	1.51	0.660228
FDI	1.39	0.717704
Remittances	1.23	0.811938
Government Expenditures	1.19	0.838002
Inflation	1.15	0.866690
Mean VIF	1.83	

TABLE 4

Shapiro-Wilk Test of Normal Data for Equations (3) and (4)

Variable	Equations	Observations	W	V	Z	Prob>z
Residual	3.3	336	0.78492	50.677	9.264	0.10
Residual	3.4	271	0.95003	9.7300	5.315	0.10

V. Results and Discussion

In estimation, the focussed Equation (3) models the Kuznets' inverted U-Shaped hypothesis and non-linear inequality effect of trade openness. The estimation strategy is as follows: First, parameter estimates have been obtained for all selected developing countries. Second, additional control variables are introduced to test the sensitivity of trade openness effect on inequality. Third, parameter estimates have been replicated using alternative econometric techniques to address the possible presence of endogeneity problem and to assess the robustness of results. Fourth, a number of robustness checks have been applied to test the consistency and stability of main findings of the study.

Column (1) of Table 5 reports results for inequality effect of trade in all selected developing countries using Ordinary Least Square (OLS) econometrics technique. The parameter estimate on trade openness is significant with positive sign implying that, on its own, openness exerts an adverse influence on inequality in developing countries. This finding is consistent with the prediction of theoretical models of technological diffusion and skill premium. However, this positive influence disappears when interactive effect of trade and development is estimated. The interaction effect of trade openness and development is negative and significant implying that trade helps to reduce inequalities in countries which are at higher levels of economic development. Thus, as developing countries move up the income scale - the inequality-increasing effect of rising trade openness comes to be outweighed by the inequality-reducing effect, as openness rises, of (Openness*GDP-per-person). This is our central finding - that development turns trade, via the interaction effect, from inequality-increasing into in inequality increasing.

The direct impact of trade on inequality is 0.02 while the indirect im-pact is -0.003 (see, Tables 6 and 7). The positive direct impact of trade on inequality outweighs the indirect negative impact of trade openness at lower level of economic development. Nevertheless, the negative indirect impact keeps increasing with the increasing level of economic development. After certain points it outweighs the positive impact and have been calculated at $4027 per person per year.

Findings of the study suggest that one unit of rise in (M+X)/Y leads to a 1.5 per cent rise in the Gini for the average developing country in the lower half of GDP-per-person (i.e., $935 per person per year and above), but to a 0.2 per cent fall in the Gini for an average developing country in the upper half of GDP-per-person (i.e., $3706 per person per year and above), assuming other factors remain constant.

The remaining columns of Table 5 show that our results are robust to inclusion of the additional control variables, i.e., sensitivity analysis shows that findings of the study are not sensitive to the inclusion of different control variables. The analysis also shows that financial development and government spending help to decrease inequalities while population growth and inflation tend to worsen the inequalities.

TABLE 5

Inequality in Developing Countries

Independent Variables	Dependent Variables: Inequality					
	1	2	3	4	5	6
Log (per capita GDP)	0.82 (4.29)***	0.94 (3.82)***	0.89 (3.55)***	0.87 (3.76)***	0.93 (3.71)***	0.82 (3.09)***
Log (per capita GDP) squared	-0.04 (-3.36)***	-0.04 (-2.74)***	-0.04 (-2.48)***	-0.04 (-2.62)***	-0.04 (-2.59)***	-0.04 (-2.04)**
Trade Openness	0.015 (4.46)***	0.018 (4.93)***	0.019 (5.06)***	0.017 (5.01)***	0.018 (4.81)**	0.018 (4.60)
Trade and Economic Development	-0.002 (-4.70)***	-0.002 (-5.14)***	-0.002 (-5.28)***	-0.002 (-5.16)***	-.002 (-4.94)***	-0.002 (-4.71)***
Human Capital		-0.004 (-7.22)***	-0.004 (-7.33)***	-0.0004 (-0.59)***	-0.001 (-1.76)*	-0.001 (-1.62)*
Financial Intermediation			0.0003 (0.91)	-0.0003 (-1.00)	-.0003 (-1.14)	-0.0001 (-0.35)
Population				0.12 (7.21)***	0.095 (6.40)***	0.10 (7.01)***
Government Expenditures					-0.006 (-4.49)***	-0.007 (-5.15)***
Inflation						0.001 (4.04)***
Constant	-0.020 (0.03)	-0.71 (-0.76)	-0.59 (-0.61)	-0.85 (-0.97)	-0.095 (-1.00)	-0.56 (-0.56)
F-Test	27.40 (0.000)	31.86 (0.000)	26.54 (0.000)	31.75 (0.000)	34.60 (0.000)	33.08 (0.000)
R-Squared	0.22	0.33	0.33	0.45	0.50	0.52
Observations Countries	336 65	272 65	268 65	268 65	267 65	267 65

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

TABLE 6

Inequality in developing countries with alternative econometric techniques

Independent Variables	Dependent Variables: Inequality					
	1	2	3	4	5	6
	2SLS	2SLS	LIML	LIML	GMM	GMM
Log (per capita GDP)	1.50	1.41	1.52	1.42	1.52	1.43
	(4.27)***	(4.23)***	(4.28)***	(4.24)***	(4.12)***	(4.06)***
Log (per capita GDP) squared	-0.07	-0.07	-0.07	-.07	-0.07	-0.07
	(-3.25)***	(-3.15)***	(-3.26)***	(-3.16)***	(-3.14)***	(-03.05)***
Trade Openness	0.022	0.023	0.022	0.023	0.021	0.022
	(4.73)***	(5.28)***	(4.72)***	(5.27)***	(3.81)***	(4.31)***
Trade and Economic Development	-0.003	-0.003	-0.003	-.003	-0.003	-0.003
	(-4.79)***	(-5.43)***	(-4.77)***	(-5.41)***	(-3.87)***	(-4.46)***
Human Capital	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(-2.11)**	(-2.31)**	(-2.11)**	(-2.32)**	(-2.50)***	(-2.74)***
Financial Intermediation	-0.0003		-0.0003		-0.0003	
	(-0.93)		(-0.94)		(-0.95)	
Population	0.092	0.079	0.092	0.079	0.091	0.080
	(5.20)***	(4.90)***	(5.20)***	(4.90)***	(5.64)***	(4.78)***
Government Expenditures	-0.006	-0.006	-0.006	-0.006	-0.006	-0.007
	(-3.90)***	(-4.29)***	(-3.90)***	(-4.29)***	(-3.95)***	(-4.20)***
Inflation	0.001	0.001	0.001	0.001	0.001	0.002
	(2.27)***	(2.70)***	(2.26)***	(2.69)***	(2.89)***	(3.42)***
Constant	-3.56	-3.16	-3.58	-3.19	-3.55	-3.19
	(-2.62)***	(-2.46)***	(-2.64)***	(-2.48)***	(-2.54)***	(-2.35)***
WaldX^2	227.52	227.01	227.57	227.10	269.93	241.56
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sargan-Test	1.91	2.21	1.93	2.24		
	(0.17)	(0.14)	(0.16)	(0.13)		
Basmann-Test	1.83	2.13	1.84	2.14		
	(0.18)	(0.14)	(0.18)	(0.15)		
Hansen-Test					1.35	1.62
					(0.25)	(0.20)
R-Squared	0.49	0.49	0.50	0.50	0.50	0.50
Observations Countries	203	207	203	207	203	207
	65	65	65	65	65	65

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

TABLE 7

Inequality in Developing Countries Controlling for Regional Effects

Independent Variables	Dependent Variables: Inequality					
	1 2SLS	2 2SLS	3 LIML	4 LIML	5 GMM	6 GMM
Log (per capita GDP)	1.61 (5.32)***	1.45 (4.62)***	1.61 (5.33)***	1.48 (4.64)***	1.62 (6.39)***	1.43 (5.19)***
Log (per capita GDP) squared	-0.08 (-4.27)***	-0.08 (-4.14)***	-0.08 (-4.28)***	-0.08 (-4.15)***	-0.08 (-5.14)***	-0.08 (-4.65)***
Trade Openness	0.02 (6.07)***	0.014 (3.51)***	0.02 (6.05)***	0.014 (3.50)***	0.02 (5.73)***	0.01 (3.32)***
Trade * Economic Development	-0.003 (-6.04)***	-0.002 (-3.52)***	-0.003 (-6.02)***	-0.002 (-3.52)***	-0.003 (-5.78)***	-0.002 (-3.31)***
Human Capital	-0.001 (-0.83)	-0.0001 (-0.17)	-0.001 (-0.84)	-0.0001 (-0.17)	-0.001 (-1.36)	-0.0003 (-0.47)
Financial Intermediation	-0.0003 (-0.93)		-0.0003 (-0.94)		-0.0003 (-0.95)	
Population	0.04 (2.07)***	0.025 (1.51)	0.04 (2.07)**	0.025 (1.51)	0.03 (2.39)***	0.02 (1.41)
Government Expenditures	-0.003 (-2.39)***	-0.003 (-2.21)***	-0.003 (-2.39)***	-0.003 (-2.22)***	-0.004 (-2.75)***	-0.004 (-2.75)***
Inflation	0.001 (2.67)***	0.001 (1.80)*	0.001 (2.66)***	0.001 (1.79)*	0.001 (3.55)***	0.001 (2.55)***
Constant	-3.77 (-3.21)***	-2.57 (-2.03)***	-3.82 (-3.23)***	-2.63 (-2.06)***	-3.77 (-3.85)***	-2.47 (-2.20)***
East Asia & Pacific	-0.19 (-6.31)***	-0.20 (-2.26)***	-0.18 (-6.32)***	-0.20 (-2.27)***	-0.19 (-6.65)***	-0.19 (-2.99)***

(Continued)

TABLE 7

(Continued)

Independent Variables	Dependent Variables: Inequality					
	1 2SLS	2 2SLS	3 LIML	4 LIML	5 GMM	6 GMM
Europe & Central Asia	-0.28 (-7.41)***	-0.29 (-3.56)***	-0.28 (-7.39)***	-0.29 (-3.57)***	-0.27 (-9.54)***	-0.27 (-5.63)***
Middle East & North Africa	-0.25 (-5.56)***	-0.26 (-2.58)***	-0.25 (-5.57)***	-0.26 (-2.59)***	-0.25 (-6.97)***	-0.24 (-3.28)***
Latin America & Caribbean		0.04 (0.47)		0.04 (0.45)		0.06 (0.85)
South Asia		-0.23 (-2.58)***		-0.23 (-2.34)***		-0.21 (-2.82)***
Sub-Saharan Africa		-0.02 (-0.17)		-0.02 (-0.16)		-0.01 (-0.10)
WaldX^2	441.12 (0.000)	560.15 (0.000)	411.71 (0.000)	559.71 (0.000)	619.88 (0.000)	917.89 (0.000)
Sargan-Test	3.82 (0.15)	3.26 (0.20)	3.90 (0.14)	3.31 (0.19)		
Basmann-Test	3.64 (0.18)	3.04 (0.14)	1.83 (0.18)	1.53 (0.15)		
Hansen-Test					3.81 (0.15)	3.13 (0.21)
R-Squared	0.66	0.72	0.65	0.72	0.65	0.72
Observations Countries	207	207	207	207	207	207
	65	65	65	65	65	65

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

Table 6 replicates the benchmark findings using alternative econometric techniques. The coefficient on trade openness on the Gini enters robustly positive and significant at 1 per cent; but the interaction effect of trade openness and GDP-per-person on the Gini is always (robustly) negative and significant at 1 per cent. The latter effect becomes increasingly dominant at higher or rising GDP-per-person among the developing countries. There, the inequality effect of trade openness varies depending upon the level of economic development.

1. Robustness Checks

In the literature (Sector II), some studies have noted the limitations of cross-country regression analysis. For instance, studies by Leamer (1983), Levine and Renelt (1992) and Hoover and Perez (2004) points out that cross-country regressions are sensitive to different robustness checks. A number of tests are applied to test the stability and consistency of main findings. This section provides discussion and interpretation of the robustness analysis.

Although, trade causes adverse effect on income inequality, it is possible that this effect is not consistent across regions. In order to assess the robustness of findings of this study to the regional effects, seven regional dummies are introduced: East Asia and Pacific, Europe and Central Asia, Middle East and North Africa, Latin America and Caribbean, South Asia and Sub-Saharan Africa. After including the regional control variable, results have been reported in Table 7. It is evident form all columns of the table that our results are not sensitive to regional specific factors.

It is important to note that there are familiar problems with the proxy of economic development. Two of these are: (a) Sub-Saharan Africa GDP data are very weak [see, for details, Lipton (2013) and Jerven (2013)]. It is evident from Table 7 that coefficients for the Sub-Saharan Africa are insignificant; (b) mineral economies are different, i.e., high (or rising) mineral-based GDP often goes with little or no improvement in other signs of development or even fall in mass poverty. Keeping in view these limitations of the proxy of economic development, the empirical analysis have been replicated, excluding the Sub-Saharan Africa countries and mineral economies.

In Table 8 we have replicated the benchmark findings, excluding the Sub-Saharan Africa. This is because of poor nation accounts for these countries. The magnitudes of coefficients do change but the direction of effect and levels of significance remain same. Findings of the study remain consistent after the exclusion of sub-Saharan Africa.

It is possible that the benchmark findings are not consistent across different decades. In order to control these time effects four dummy variables: 1970s, 1980s, 1990s, and 2000s, have been used. Table 9 replicates the benchmark finding using time related fixed effects. The results are robust to inclusion of the time specific ef-

TABLE 8

Inequality in Developing Countries Excluding Sub-Saharan Africa

Variables	1 2SLS	2 2SLS	3 GMM	4 GMM
Log (per capita GDP)	2.139*** (6.077)	1.871*** (5.476)	2.088*** (7.322)	1.837*** (6.588)
Log (per capita GDP) squared	-0.114*** (-5.099)	-0.106*** (-4.986)	-0.111*** (-6.095)	-0.103*** (-5.969)
Trade Openness	0.0205*** (5.049)	0.0124*** (2.859)	0.0206*** (5.459)	0.0127*** (3.135)
Trade * Economic Development	-0.00236*** (-5.126)	-0.00146*** (-2.939)	-0.00236*** (-5.546)	-0.00148*** (-3.169)
Human Capital	-0.000373 (-0.487)	-2.81e-05 (-0.0387)	-0.000711 (-1.028)	-0.000264 (-0.393)
Population	0.0349** (2.122)	0.0341** (2.086)	0.0329** (2.326)	0.0303** (2.018)
Government Expenditures	-0.00355*** (-2.749)	-0.00279** (-2.259)	-0.00427*** (-3.538)	-0.00328*** (-2.625)
Inflation	0.00115** (2.477)	0.000642 (1.441)	0.00131*** (3.473)	0.000792** (2.210)
East Asia and Pacific	-0.180*** (-6.420)	-0.221** (-2.536)	-0.184*** (-6.466)	-0.206*** (-3.334)
Europe and Central Aisa	-0.268*** (-7.561)	-0.292*** (-3.737)	-0.264*** (-9.406)	-0.278*** (-5.591)
Middle East and North Africa	-0.253*** (-5.913)	-0.293*** (-3.004)	-0.249*** (-7.259)	-0.271*** (-3.738)
South Asia		-0.214** (-2.272)		-0.193** (-2.567)
Latin America and Carrabin		0.0153 (0.166)		0.0317 (0.440)
Constant	-6.001*** (-4.355)	-4.334*** (-3.123)	-5.760*** (-5.168)	-4.205*** (-3.704)
Sargan-Test	5.97 (0.05)	4.06 (0.13)		
Basmann-Test	5.7 (0.06)	3.80 (0.15)		
Hansen-Test			4.8 (0.10)	3.5 (0.18)
Observations	189	189	189	189
R-squared	0.718	0.756	0.717	0.755

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

TABLE 9

Inequality all Developing Countries Controlling for Time Effects

Independent Variables	Dependent Variables: Inequality					
	2SLS	2SLS	LIML	LIML	GMM	GMM
Log (per capita GDP)	1.42 (4.25)***	1.53 (4.36)***	1.43 (4.27)***	1.55 (4.37)***	1.45 (4.10)***	1.56 (4.23)***
Log (per capita GDP) squared	-0.07 (-3.13)***	-0.07 (-3.30)***	-0.07 (-3.14)***	-0.08 (-3.31)***	-0.07 (-3.05)***	-0.08 (-3.21)***
Trade Openness	0.02 (5.26)***	0.02 (4.74)***	0.02 (5.25)***	0.02 (4.72)***	0.02 (4.15)***	0.02 (3.71)***
Trade * Economic Development	-0.003 (-5.42)***	-0.003 (-4.81)***	-0.003 (-5.40)***	-0.003 (-4.78)***	-0.002 (-4.32)***	-0.003 (-3.79)***
Human Capital	-0.002 (-2.55)***	-0.002 (-2.37)***	-0.002 (-2.56)***	-0.002 (-2.38)***	-0.002 (-2.98)***	-0.002 (-2.79)***
Financial Intermediation		-0.0004 (-0.94)		-0.0004 (-0.95)		-0.0003 (-0.94)
Population	0.08 (4.73)***	0.09 (5.07)***	0.08 (4.73)***	0.09 (5.07)***	0.08 (4.46)***	0.09 (5.31)***
Government Expenditures	-0.006 (-3.77)***	-0.005 (-3.30)***	-0.006 (-3.77)***	-0.005 (-3.30)***	-0.006 (-3.53)***	-0.006 (-3.27)***
Inflation	0.001 (2.49)***	0.001 (2.08)**	0.001 (2.48)***	0.001 (2.07)****	0.001 (3.11)***	0.001 (2.55)***

(Continued)

TABLE 9

(Continued)

Independent Variables	Dependent Variables: Inequality					
	2SLS	2SLS	LIML	LIML	GMM	GMM
Constant	-3.11 (-2.40)***	-3.59 (-2.64)***	-3.15 (-2.43)***	-3.64 (-2.66)***	-3.20 (-2.35)***	-3.66 (-2.61)***
1980s	-0.10 (-1.08)	-0.09 (-0.74)	-0.10 (-0.82)	-0.10 (-0.74)	-0.10 (-1.56)	-0.09 (-1.55)
1990s	-0.13 (-1.08)	-0.13 (-1.06)	-0.13 (-1.08)	-0.13 (-1.06)	-0.13 (-2.06)**	-0.13 (-1.24)
2000s	-0.11 (-0.90)	-0.10 (-0.82)	-0.11 (-0.91)	-0.10 (-0.82)	-0.11 (-1.56)	-0.10 (-1.57)
WaldX^2	231.57 (0.000)	232.54 (0.000)	231.72 (0.000)	232.63 (0.000)	263.89 (0.000)	294.40 (0.000)
Sargan-Test	2.87 (0.23)	2.48 (0.29)	2.92 (0.23)	2.51 (0.29)		
Basmann-Test	2.72 (0.26)	2.32 (0.31)	1.37 (0.26)	1.17 (0.31)		
Hansen-Test					2.47 (0.29)	2.20 (0.33)
R-Squared	0.49	0.50	0.49	0.50	0.49	0.50
Observations Countries	207 65	203 65	207 65	203 65	207 65	203 65

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

fects. The independent effect of increased trade openness on inequality is inequality-widening, while the combined effect of increased trade openness and its interaction with real GDP-per-person is inequality-narrowing. Therefore, relatively developed economies are in better position to take favourable effects of trade. To check the validity of instrument variables Sargan and Hansen tests have been applied. The p-values of these tests do not reject the null hypothesis, and therefore, instrument variables are valid and our results are not plagued by the endogenity problem.

The countries at lower levels of economic development have, for example, weak trade unions, labour market frictions, fragile financial sector and unequal access to schooling as compared to developing countries with higher GDP-per-person. To reflect the domestic conditions of a trade integrating economy proxies are employed to financial development and human capital. The results reported in Table 10 show that the direct effect of trade is inequality-increasing, while its effect in economies with better financial development and strong human capital is inequality-deceasing.

In Table 11 results have been extended our across different levels of economic development. The results show that the trade inequality sequence is sensitive to different levels of economic development. In low-income developing countries trade causes adverse impact on inequality. In the middle income countries inequality-effect of trade is insignificant. Finally, in the high income countries this effect is reverse as trade reduces inequality in high income countries.

It is expected that huge rise in migrants' remittances, also part of 'globalization', must have affected inequality within developing countries substantially. In Table 12 migrants' remittances have been used as an additional control variable to determine the direction of relationship between remittances and inequality. The parameter estimate on remittances turns out to be positive, however, its effect is insignificant. Foreign direct investment (FDI), another indicator of globalization, also has been included to see its impact on inequality. The inequality effect of FDI turns out to be positive and significant. Nevertheless, the benchmark findings remain intact after inclusion of migrants' remittances and FDI.

Since mineral economies are different, i.e. high (or rising) mineral-based GDP often goes with little or no improvement in other signs of development or even fall in mass poverty - keeping in view these limitations of the proxy of economic development, the empirical analysis excluding mineral economies have been replicated. The results reported in Table 13 show that main findings of the study are not sensitive to the exclusion of mineral economies.

Table 14 replicates the Equation (3) after controlling the effect of Gini when it represents consumption inequality instead of income inequality. A dummy variable have been used to isolate the effects of consumption inequality which appears to be significant. However, the benchmark findings remain consistent even after controlling for the consumption inequality. Column 3 of the Table 14 reports results with instruments. Column 4 and column 5 reports results excluding sub-Saharan

TABLE 10

Inequality in Developing Countries with Interactive Terms
for Financial Development and Human Capital

Variables	Dependent Variables: Inequality			
	1 OLS	2 OLS	3 2-SLS	4 2-SLS
Log (per capita GDP)	0.794*** (3.582)	1.211*** (5.746)	1.395*** (3.523)	2.043*** (6.371)
Log (per capita GDP) squared	-0.0432*** (-3.149)	-0.0684*** (-5.240)	-0.0786*** (-3.271)	-0.117*** (-5.985)
Trade Openness	0.00502*** (5.264)	0.00744*** (3.865)	0.00601*** (3.201)	0.00880*** (2.663)
Human Capital	0.00457*** (3.661)	-0.000721 (-0.857)	0.00514** (2.387)	-0.00126 (-1.217)
Trade* Human Capital FI	-8.46e-05***	0.00422***	-9.79e-05***	0.00454**
Trade* FI		-0.00185*** (-4.070)		-0.00221*** (-2.807)
Population	0.0864*** (5.940)	0.126*** (7.521)	0.0750*** (4.413)	0.126*** (5.942)
Government Expenditure	-0.00717*** (-5.702)	-0.00552*** (-4.164)	-0.00648*** (-4.274)	-0.00531*** (-3.220)
Inflation	0.00114*** (3.948) (-5.883)	0.00108*** (3.552)	0.00188*** (3.242) (-3.504)	0.00120* (1.959)
Constant	-0.113 (-0.131)	-1.740** (-2.082)	-2.689* (-1.750)	-5.261*** (-4.080)
Sargan-Test			1.40 (0.24)	1.10 (0.29)
Basmann-Test			1.34 (0.25)	1.05 (0.31)
Observations	271	267	206	203
R-squared	0.499	0.471	0.499	0.425

Note: T-stats are in parenthesis: * denotes statistically significant at the 10% level. ** denotes statistically significant at the 5% level. *** denotes statistically significant at the 1% level.

TABLE 11

Inequality in Developing Countries
by Disaggregated Level of Income

Variables	Dependent Variables: Inequality		
	1 LIC	2 MIC	3 HIC
Log (per capita GDP)	0.0999** (2.201)	0.897** (2.135)	3.221*** (5.066)
Log (per capita GDP) squared		-0.0526** (-2.026)	-0.189*** (-5.047)
Trade Openness	0.00247*** (4.151)	-0.000769 (-1.539)	-0.00105** (-2.447)
Human Capital	-0.000368 (-0.212)	-0.00118 (-1.389)	-0.00385* (-1.762)
Population	0.0829** (2.209)	0.0628*** (4.141)	0.0672 (1.588)
Government Expenditures	0.00166 (0.524)	-0.0124*** (-8.388)	-0.00750*** (-2.871)
Inflation	0.00124 (1.621)	0.000451 (1.395)	0.000139 (0.236)
Constant	2.570*** (7.403)	0.225 (0.133)	-9.424*** (-3.505)
Observations	80	110	81
R-squared	0.353	0.613	0.716

Note: LIC (Low Income Countries); MIC (Middle Income Countries); HIC (High Income Countries). The classification of low, middle and high income countries in this study follows the World Bank's classification of countries according to in-come level. T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

TABLE 12

Inequality in Developing Countries
Including Remittances and FDI

Variables	1	2
Log (per capita GDP)	0.807***	0.874***
	(3.411)	(3.979)
Log (per capita GDP) squared	-0.0356**	-0.0402***
	(-2.314)	(-2.842)
Trade Openness	0.0169***	0.0160***
	(4.860)	(5.229)
Trade*Economic Development	-0.00208***	-0.00202***
	(-5.128)	(-5.614)
Human Capital	-0.000769	-0.000582
	(-1.020)	(-0.780)
Population	0.0998***	0.110***
	(5.937)	(6.444)
Remittances	0.00156	
	(0.658)	
FDI		0.0102***
		(3.295)
Constant	-0.563	-0.825
	(-0.621)	(-0.970)
Observations	266	271
R-squared	0.432	0.454

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

TABLE 13

Inequality in Developing Countries
Excluding Mineral Economies

Variables	1	2
Log (per capita GDP)	0.923***	0.966***
	(3.829)	(4.142)
Log (per capita GDP) squared	-0.0448***	-0.0474***
	(-2.866)	(-3.149)
Trade Openness	0.0136***	0.0140***
	(3.865)	(4.275)
Trade*Economic Development	-0.00168***	-0.00174***
	(-4.105)	(-4.625)
Human Capital	-0.00161**	-0.00143*
	(-2.048)	(-1.796)
Population	0.0883***	0.0969***
	(4.857)	(5.198)
Remittances	0.00255	
	(1.127)	
FDI		0.00817***
		(2.607)
Constant	-0.845	-1.041
	(-0.909)	(-1.152)
Observations	220	223
R-squared	0.444	0.456

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statisti-cally significant at the 1% level.

TABLE 14
Inequality in Developing Countries Including Dummy Variable for Consumption Ginis

Variables	1	2	3	4	5	6	7
Log (per capita GDP)	0.880***	0.858***	1.397***	2.123***	1.454***	1.387***	2.064***
	(4.584)	(3.767)	(4.456)	(5.448)	(4.238)	(3.696)	(6.738)
Log (per capita GDP) Squared	-0.0484***	-0.0395***	-0.0678***	-0.112***	-0.0726***	-0.0790***	-0.119***
	(-3.675)	(-2.665)	(-3.353)	(-4.514)	(-3.259)	(-3.466)	(-6.387)
Trade Openness	0.0149***	0.0160***	0.0229***	0.0184***	0.0207***	0.00606***	0.00738**
	(4.366)	(4.844)	(5.635)	(3.961)	(4.559)	(3.405)	(2.330)
Trade*Economic Development	-0.00191***	-0.00198***	-0.00271***	-0.00221***	-0.00244***		
	(-4.625)	(-5.114)	(-5.778)	(-4.181)	(-4.706)		
Human Capital		-0.00112	-0.00264***	-0.00193**	-0.00324***	0.00471**	-0.00181*
		(-1.624)	(-2.988)	(-2.140)	(-3.523)	(2.300)	(-1.820)
Population		0.102***	0.0804***	0.0776***	0.0681***	0.0756***	0.119***
		(6.311)	(5.274)	(5.194)	(4.151)	(4.694)	(5.874)
Government Expenditures			-0.00650***	-0.00694***	-0.00721***	-0.00650***	-0.00552***
			(-4.574)	(-4.984)	(-4.942)	(-4.525)	(-3.505)
Inflation			0.00128**	0.00113**	0.00121**	0.00169***	0.00108*
			(2.442)	(2.197)	(2.193)	(3.050)	(1.831)
Remittances		0.00303					
		(1.173)					
Trade* Human Capital						-9.81e-05***	
						(-3.703)	
Trade*FI							-0.00187**
							(-2.471)
FI							0.00378**
							(2.126)
Consumption Inequality	-0.108***	-0.163***	-0.161***	-0.153***	-0.129***	-0.150***	-0.143***
	(-4.189)	(-5.553)	(-5.067)	(-4.522)	(-3.496)	(-4.671)	(-4.036)
Constant	-0.143	-0.667	-2.981**	-5.943***	-3.072**	-2.544*	-5.180***
	(-0.208)	(-0.764)	(-2.466)	(-3.904)	(-2.350)	(-1.747)	(-4.204)
Sargan-Test			2.44	3.62	3.79	1.04	0.94
			(0.29)	(0.16)	(0.15)	(0.31)	(0.33)
Basmann-Test			2.33	3.46	3.60	0.99	0.89
			(0.31)	(0.18)	(0.17)	(0.32)	(0.35)
Observations	336	266	207	189	168	206	203
R-squared	0.236	0.487	0.553	0.610	0.570	0.549	0.476

Note: T-stats are in parenthesis: * denotes statistically significant at the 10% level. ** denotes statistically significant at the 5% level. *** denotes statistically significant at the 1% level.

Africa and mineral economies, respectively. Finally column 6 and 7 introduce interactive terms for human capital and financial development, respectively. All regressions in this Table do indicate that consumption inequality does matter as its impact is significant. Nevertheless, findings of the study remain consistent and stable after controlling the effect of Gini based consumption inequality.

After removing the outliers, results are reported in Table A-1 (see Appendix). The basic model has been re-estimated four times; after removing, in turn, the five values (i.e., countries) with the lowest inequality and five values with the highest inequality. Then similarly five values with the lowest trade and five values with the highest trade were also re-estimated. In each case, although the values of the coefficients do fluctuate, the coefficients remain significant with same signs. Table A-1 (see Appendix) suggests that our results do not depend on extreme values of the dependent variable, or the main explanatory variable.

VI. Conclusion

This study examines the impact of trade on cross-country inequality using a panel data set from 65 developing counties, over a long period 1970-2008. This study differs from the existing literature on distribution impact of trade by explicitly noting the importance of different development levels in shaping the link.

Is trade in developing countries a blessing or a curse? The evidence presented in this paper suggests that the answer to this question is that it is ‘‘mixed blessing”: on an average trade does widen inequality in our sample of developing countries. However, the positive sign of the paper is that the size and sign of the impact depends on a level of development that is amenable to policy action.

The results reported in this paper show that the effect of trade on inequality could be either way depending upon the level of development of a trade-integrating economy. Those countries that have a high level of economic development seem to acquire a favourable effect while underdeveloped economies suffer. Thus, trade does not accentuates, ameliorates inequality in countries with low level of economic development.

Thus, as developing countries move up, the income scale - the inequality-increasing effect of rising trade openness comes to be outweighed by the inequality-reducing effect, as openness rises, of (Openness*GDP-per-person). This is the central finding - that development turns trade, via the interaction effect, from inequality increasing into in inequality decreasing.

The results reported in this study show that rising real GDP-per-person turns increasing trade openness, at very low GDP-per-person levels – via its direct effect, the friend of within-country inequality (Gini) - into its enemy via the rising influence of the (always anti-inequality) interaction effect between trade and rising GDP-per-person. The approximate “turning-point” level of income-per-person

is $4027 per person per year at which (other relevant variables constant at their means) extra trade openness via direct-plus-interaction effects turns from friend into enemy of inequality.

The analysis implies that poor of the underdeveloped countries suffer from trade and therefore, these countries need more protectionist policies to safeguard the interests of poor, while countries at higher levels of economic development may follow more trade-liberalized policies as trade is not harmful for poor in these countries.

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APPENDIX

TABLE A-1

Inequality in Developing Countries Excluding Outliers

Variables	Excluding 5 extreme low inequality values	Excluding 5 extreme high inequality values	Excluding 5 extreme low trade values	Excluding 5 extreme high trade values
Log (per capita GDP)	0.787***	0.785***	0.807***	0.740***
	(3.648)	(3.656)	(3.732)	(3.435)
Log (per capita GDP) Squared	-0.0337**	-0.0338**	-0.0349**	-0.0296**
	(-2.406)	(-2.424)	(-2.488)	(-2.114)
Trade Openness	0.0177***	0.0182***	0.0179***	0.0200***
	(6.133)	(6.336)	(6.189)	(6.745)
Trade*Eco Development	-0.00212***	-0.00218***	-0.00215***	-0.00244***
	(-6.263)	(-6.451)	(-6.329)	(-6.902)
Human Capital	-0.00138*	-0.00124	-0.00132*	-0.00129
	(-1.746)	(-1.582)	(-1.673)	(-1.649)
Population	0.0931***	0.0919***	0.0941***	0.0904***
	(6.561)	(6.470)	(6.602)	(6.247)
Government Expenditures	-0.00717***	-0.00696***	-0.00712***	-0.00739***
	(-5.785)	(-5.617)	(-5.724)	(-5.963)
Inflation	0.00108***	0.000831***	0.00108***	0.00106***
	(3.795)	(2.711)	(3.781)	(3.705)
Constant	-0.380	-0.373	-0.468	-0.247
	(-0.460)	(-0.453)	(-0.565)	(-0.299)
Observations	270	267	271	267
R-squared	0.504	0.500	0.508	0.526

Note: T-stats are in parenthesis: *denotes statistically significant at the 10% level. **denotes statistically significant at the 5% level. ***denotes statistically significant at the 1% level.

TABLE A-2

List of Developing Countries

1.	Algeria	23.	Honduras	45.	Pakistan
2.	Argentina	24.	Hungary	46.	Panama
3.	Armenia	25.	India	47.	Paraguay
4.	Azerbaijan	26.	Indonesia	48.	Peru
5.	Bangladesh	27.	Iran	49.	Philippines
6.	Belarus	28.	Ivory Coast	50.	Poland
7.	Brazil	29.	Jamaica	51.	Romania
8.	Bulgaria	30.	Jordan	52.	Russia
9.	Cameroon	31.	Kazakistan	53.	Senegal
10.	Chile	32.	Korea Rep.	54.	Slovenia
11.	China	33.	Kyrgyz Rep.	55.	Sri Lanka
12.	Colombia	34.	Latvia	56.	Tajikistan
13.	Costa Rica	35.	Lesotho	57.	Thailand
14.	Czech Rep.	36.	Lithuania	58.	Tunisia
15.	Dominican Rep.	37.	Madagascar	59.	Turkey
16.	Ecuador	38.	Malaysia	60.	Uganda
17.	Egypt	39.	Mali	61.	Ukraine
18.	El Salvador	40.	Mauritania	62.	Uruguay
19.	Estonia	41.	Mexico	63.	Venezuela
20.	Ethiopia	42.	Morocco	64.	Vietnam
21.	Georgia	43.	Nepal	65.	Zambia
22.	Ghana	44.	Nigeria		