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Threshold and Interaction Effects in the Trade, Growth and Inequality Relationship

Vincent Leyaro
Department of Economics, University of Dar es Salaam
Tel: +255 22 2410252, Email: vleyaro@yahoo.com

Abstract

This paper examines the relationship between trade (exports), economic growth and income inequality, with the focus of establishing the latest evidence of a link between growth, exports and inequality, using a panel of 100 countries over 30 years (1980 to 2010). As there is no clear theoretical relationship between trade (exports) and inequality and as inequality can be considered a proxy for 'governance quality' the paper also tests for a threshold in inequality for the effect of trade (exports) on growth. The study finds that in general trade openness advances economic growth and income inequality reduces economic growth. However, when we identify an income inequality threshold we find that inequality is positively associated with growth if below the threshold (low inequality) but negatively above the threshold whereas trade has a positive impact once the threshold is allowed for (i.e. above and below). Thus, trade generally promotes economic growth and relatively high inequality retards growth.

JEL Classification: F10, O11, 13
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1. Introduction

'Income inequality is defining challenge of our time.'

President Barack Obama speaks in Washington on December 4, 2013 about the need to address income disparity.

Not just in the advanced economies in the North and West, which were thought to have reached levels of prosperity where inequality would level off in line with the prediction of Kuznets hypothesis, rising income inequality is also experienced across and within most of emerging and developing countries in Emerging Europe, Asia, Latin America and Africa. Despite differences across regions and countries, much of increase in inequality has happened at the upper end of the income distribution. Atkinson, Piketty and Saez (2011) data show a big increase in top 1 percent income share in countries like United States, United Kingdom and Canada, hence the 'we are the 99 percent' slogans of the Occupy Wall Street movement. In the US for example, over the past four decades, the Gini coefficient has risen from around 30 percent to around 40 percent and the income share of the top 10 percent increased from around 33 percent to 50 percent in the same period.[1] In developing world, inequality has risen in emerging Europe, Asia, Latin America and Africa countries. For example, China has experienced a sharp rise inequality, where from 1981 to 2010 the Gini coefficient has increased from 24 to 40 and the income share of the top 10 percent in increased from 17 to 28 percent between 1986 and 2003. However, it is also important to note that inequality has remained stable in other countries, and fallen appreciably in still others. According to the Atkinson, Piketty and Saez (2011) and LIS data, income inequality have been stable or even declining slightly since the mid-20th century in countries such as Australia, Denmark, France, Ireland, Norway, Switzerland and Spain. It has changed little in some emerging and developing countries such as in India and Mexico; decline in others such as Brazil and including those in SSA. In Brazil for instance, the Gini coefficient has declined from around 60 percent in the 1981 to around 55 percent in 2010.

As the result, rising income inequality across and within countries over the past two decades or so poses one of the greatest challenges to economic policy makers in both developed and developing countries. Concerns about inequality are at the forefront of many policy debates today and is on top of policy agenda in every corner of the world. The IMF is

[1] According to LIS data, oother advanced economies that have experienced rising income inequality include Sweden, Netherlands, Luxembourg, Italy, Israel, Poland, Finland, Austria, Belgium and Germany

today embracing redistribution policies as pro-growth, arguing that rising income is damaging to economic growth (Ostry, et al, 2014).The World Bank has recently made a major public commitment to the goal of promoting "shared prosperity", defined as growth in average incomes of those in the bottom 40 percent of the income distribution in each country in the developing world (Dollar, et al, 2014).Even the Pope is discussing the growing economic inequality, denouncing 'trickle-down' economic theories in sharp criticism of rising income inequality. Beyond policy elites, recent public opinion surveys suggest that majorities of respondents in advanced, emerging and developing economies feel that the gap between rich and the poor has worsen in recent years. According to a recent Pew survey, over 80 percent of respondents in advanced economies say things have gotten worse, compared with 70 percent in the developing economies and 59 percent in the emerging markets.

Aside the propounded positive effects of income inequality on economic growth, much of heated debate and concern is on the adverse effects of high and rising income inequality on lowering economic growth rate, on limiting the pace of absolute poverty reduction, on engendering social unrest and political instability. For instance the main concern of 'we are the 99 percent' slogans of the Occupy Wall Street movement is on the worsening income inequality between the working (and poor) class and the rich. The wave of protests and unrests that swept across the Middle East and North Africa since 2011 is due to the gross socio-economic and political inequality perpetuated by long-entrenched 'elite' in power. So is the recent unrest in Nigeria that has emerged in the name of extremists (including the Boko-haram) is as the result of increasing inequality of economic opportunities between the North and South. Wilkinson and Pickett (2010) provide abundance of evidence to show that income inequality dramatically has an impact on people's everyday lives. For example, greater inequality seems to lead to general social dysfunction*;* homicide rates are lower and children experience less violence in more equal societies; people trust each other less in more unequal societies; and less equal societies tend to do worse when it comes to health, education and general well-being. According to the UK Prime Minister, David Cameron (2009), more unequal countries do worse according to every quality of life indicators. But addressing inequality is not only about achieving a more egalitarian distribution of income for the social cohesion and wellbeing of society, it is also necessary for a stable economy.

Many leading economists regard growing inequality as one of the main causes of financial crashes: the IMF has published evidence that inequality led to the huge debts behind the 2008 bank crisis; and Rajan (2010) argues that the growing income inequality was a key

factor leading to the financial crisis and to the current economic downturn. van Treeck and Sturn (2012) survey the evidence that income inequality is a cause of the recent Great Recession. In addition, Greenspan (2007), former Chairman of the US Federal Reserve, says that increasing inequality is bad for business. To the extent that rising income inequality may reflect a lack of economic opportunity, it may itself limit the growth potential of economies by not allowing all economic agents to fully exploit the new opportunities created by globalization and limiting the productive capacity of an economy by not matching capital and labor as efficiently as possible.

The recent rising income inequality across the globe has occurred at the time that, following trade liberalisation that most countries have embraced since mid1980s, most developing countries have increasingly integrated into the global trading system, with expectation of advancing their economic growth, raising their real per capita income and reduce poverty. The entry of China and countries from the former Soviet bloc into the global economy has led to an unprecedented level of integration of the world economy. While, as the result of trade openness and globalisation, most developing countries have achieved impressive economic growth, with substantial poverty reduction only in a few regions like East Asia, poverty rates for most countries have only fallen modestly or even worsened, while income inequalities have worsening in most countries. Thus the benefits of rising incomes and aggregate GDP growth rates associated with trade openness and globalization have not been shared equally across all segments of the population. This is therefore against one of the most accepted tenets of trade theory (Stolper-Samuelson theorem), that changes in exposure to international trade alter the demand for and returns to factors and the distribution of incomes within a country. Trade (as one component of globalization) is expected to affect the poor through two major channels: its contribution to growth and its impact on income distribution (inequality). In principle, any change in income (growth) can be decomposed into two components: the change in average income (capturing poverty) and the change in income distribution (capturing inequality). That is, poverty cannot change unless income changes on average (growth) or the distribution changes (inequality).

Although the channels through which trade and globalization affect economic growth and the empirical evidence behind them are widely studied and well established, what is less clear and still fiercely debated is their distributional effects. Since this period has also been associated with unprecedented trade integration, much of the debate over rising income inequality has focused on the role that globalization–especially trade openness – has played in explaining inequality patterns; and condition on rising income inequality, what is the effect

of trade openness on economic growth? While trade openness is expected to affect economic growth positively, there is no particular reason to posit a clear relationship between trade (in particular export) and inequality. Further, the effects of trade liberalisation on poverty have remained ambiguous and the relationship between poverty and inequality is even more complex. As we are living in the era of rising income inequality, the main aim of this study is to establish if there is any evidence of a link between growth, trade (exports) and inequality. First we test for the direct effects of trade (exports) and income inequality on growth, then condition on income inequality the effect of trade (exports) on growth. As income inequality can be considered a proxy for 'governance quality' we also test for a threshold in income inequality for the effect of trade (exports) on growth.[2] Though not the main focus of this study, the analysis is extended to explore the effect of trade on poverty given rising income inequity?

To assess and explore heterogeneity in these relationships, this study is making using of the most latest and a large panel of more than 100 countries that include advanced, emerging and developing economies. And apply dynamic panel regression methods that address most econometric issues and Hansen (2000) endogenous threshold regression technique to locate the thresholds. This is besides surveying the latest literature in this area and analyzing the recent patterns of inequality, trade and growth. The plan of the paper is as follows. Section 2 summarizes both the theory and empirics on trade, growth and inequality. Section 3 specifies the contingent and threshold models formally, outlines the methods used in their estimation and data sources. Section 4 provides descriptive statistics, focusing on the current patterns of inequality, trade and growth in advanced, emerging and developing economies. Section 5 presents and discusses the empirical results on the existence of threshold and interaction effects in the trade-growth relationship given income inequality. Section 6 concludes and gives the implication of the study.

2. Trade, Growth and Income Inequality: Theory and Empirics

Since the focus of this study is on any evidence of a link between trade, growth and inequality. This section therefore reviews both theoretical and empirical evidence on the relationship between: i) trade and growth; ii) trade and inequality; iii) growth and inequality and iv) trade, inequality and poverty.

[2]This helps to answer the question does more openness to trade reduce or exacerbate inequality and effects of that in growth ?Is there a threshold in trade – inequality relationship where trade is good both for inequality and growth, and above which it worsen both inequality and growth.

Trade and Growth: Many economists today assert that trade is good for economic growth; hence countries with fewer restrictions on trade experience faster economic growth than countries that heavily restrict trade. Besides the insights offered by neoclassical trade theory that, countries that differ in comparative advantage can benefit from trade by specializing in their areas of comparative advantage, in the form of resource endowments (as in the Hecksher-Ohlin model) or differences in technology (the Ricardian model)[3]; both endogenous growth theory (Romer 1986, 1990; Lucas 1988) and new trade theory (Krugman 1980; Grossman and Helpman 1991) have provided a firm theoretical basis for linking openness to trade with long-run growth.[4]Endogenous growth models show how deliberate investment decisions made by profit maximizing firms advance innovation, and as a result economic growth is accelerated by endogenous technological improvements. From these models, the main channels through which trade is expected to affect the overall growth rate are endogenous and dynamic in nature. These include: economies of scale (i.e. a greater exploitation of increasing return); importing ideas and diffusion of information, knowledge and benefiting from better inputs and technology capacities from abroad; innovation, increased competition and so efficiency; increased availability of capital; increased product variety; technological progress; institutional change, policies and political process.

Even though, theory does not predict a simple relationship between exposure to trade and growth. Grossman and Helpman (1990), for instance, do not provide a definite answer as to whether trade intervention will increase or decrease the long run growth rate. The impact of trade restrictions on growth are very complicated as there are some models in which trade restrictions can slow down the worldwide rate of growth [but] there are others in which they can speed up worldwide rate of growth (Rivera-Batiz and Romer, 1991, p.532)'. Skeptics of trade liberalization like Krugman (1994) and Rodrik (1995) argue that the effect of openness on growth is, at best, tenuous and at worst doubtful

As the result of interest in assessing the effects of trade openness on economic growth, huge empirical studies exist that have looked at the effects of trade openness on economic growth, employing either *ex ante*modelling (such as CGE analysis) or *ex post* econometric analysis. The *ex post* econometric analysis (which is the focus of this study) distinguishes between individual country studies and cross-country studies. The former

[3] However, the standard neoclassical theory of trade predicts effects only on levels (increases in the level of income), not on the long-run growth rate (Lucas, 1988; Romer 1990; Lee, 1993; Krugman, 1994; Baldwin, 2003).

[4]Endogenous growth models offer a basis for a permanent positive effect on growth (i.e. role of increasing returns, dynamic spill-over from export sector growth, through embodied technology, input availability, technical assistance, reduced networking costs, etc). Thus, part of the new growth theory focused on the relationship between international trade and economic growth.

detailed multi-country studies of protectionist practices and liberalization episodes have been useful in providing detail on the way in which trade policies have affected economic performance. The latter cross-country regression studies aim to identify empirical regularities in the relationship between trade openness and growth, distinguishing those looking at trade performance (using outcome measures such as trade shares of GDP or indices of trade openness) from those looking at trade policy measures, such as average tariffs. Following the theoretical debate and different measures of trade openness, it is not surprising that some studies find a positive correlation between openness and growth,[5]while others do not find systematic or robust evidence of a relationship, and a few conclude that the impact is negative. Overall, the literature identifies, on average, a positive cross-country correlation between trade and growth, although the relationship is not necessarily causal (Harrison, 2006). There is no robust evidence that trade liberalisation impedes growth, instead, instead, the overwhelming evidence supports the fact that trade openness promote growth.

Most studies since the 1990s are based on cross-country regressions, mainly using outcome measures of trade or openness. Most find a positive association between trade and growth (and are thus similar in conclusions to the country case studies). The most heavily cited are Dollar (1992), Ben-David (1993, 1998), Sachs and Warner (1995), Edwards (1998), Frankel and Romer (1999). As discussed in Section 2.3, cross-country regressions have come under severe criticism (Rodrik and Rodriguez, 2001). More recent studies have essentially replicated these seminal papers using extended sample sizes, more appropriate econometric methods and additional measures of openness to address some of the criticisms. In general, they reached the same conclusion, that is, trade openness is good for economic growth. However, results are more mixed when trade policy measures are used instead of outcome measures. In particular, some find a significant and negative relationship between tariff rates and growth for richer countries but a positive relationship for poorer countries (DeJong and Ripoll, 2004; Ackah and Morrissey, 2007). Others find that the relationship between average tariffs or non-tariff barriers and economic growth varies according to the period covered.

The emerging consensus is that the potential for trade to affect growth is contingent on various economic, social, political, institutional and structural factors. Some studies specify the conditional relationship, whilst others test for the thresholds in these factors in determining the effect of trade on growth (Baldwin and Srinivasan, 2000; Rodrik and

[5]These include: Haan and Sturm (2000), Miller and Upadhyay (2000), Slaughter (2001), Alcala and Ciccone (2004), Dollar and Kraay (2003), Wacziarg and Welch (2003), Bolaky and Freud (2004), Lee et al. (2004), Bergen and Jordahl (2005).

Rodriguez, 2001; Foster, 2008; Dufrenot et al. 2009). One such factor debated recently is the contingent effect of inequality in trade – growth relationship.

Trade and Income Inequality: The prediction that changes in exposure to international trade alter the demand for and returns to factors and the distribution of incomes within a country is one of the few accepted tenets of trade theory. Goldberg and Pavcnik, (2004, 2007), Sala-i-Martin (2007), Harrison (2006), Ravallion (2004) and Milanovic (2002) review both theoretical linkages and empirical evidence on the causal links through which trade is expected to affect the distribution of income (or resources).

The traditional position in international trade on this issue is encapsulated in the Heckscher-Ohlin (HO) and Stolper-Samuelson (SS) theorems. In its simplest form this says that countries export goods intensive in their abundant factor, suggesting that the abundant factor should see an increase in its real income when a country opens up to trade. Krueger (1983) and Bhagwati and Srinivasan (2002) argue that, since developing countries are likely to have comparative advantage in goods made with unskilled labour, trade should be pro-poor as it raises the incomes (wages) of unskilled labour in poor (unskilled-labour abundant) countries. For an advanced economy where high skill factors are relatively abundant, the reverse would hold, with an increase in openness leading to higher inequality. However, most evidence suggests that the poor (or the unskilled) in developing countries are generally not better off following more than two decades of trade liberalization; in fact, most benefits, such as those captured by changes in relative wages or incomes, have accrued to labour with higher skills or education levels (Harrison, 2006, Sala-i-Martin, 2007; Goldberg and Pavcnik, 2007). Researchers have sought to explain this apparent paradox with various suggestions for why we do not observe Stolper-Samuelson effects or more generally that increased trade is not associated with reduced income (wag) inequality.[6]

Because of the lack of direct evidence on HO-SS effects, researchers have considered various extensions of the original model to explain income (wage) inequality. One is the increase in the skill premium and according to this the main contributing factor for widening wage gap between skilled and unskilled labour is an increase in the demand for skilled and well educated workers. Feenstra and Hanson (1996, 1997, 1999, and 2003) suggest that

[6]These include: Price data are incomplete and often endogenously determined (not determined by trade). Unskilled labour intensive sectors were highly protected prior to the tariff reduction during trade reforms. Evidence shows no labour reallocation. The static nature of the gains from trade. The shift in comparative advantages towards China and India from other developing countries like those found Latin America and Africa. Another criticism is that all the assumptions of HO - SS do not hold (Davis and Mishra, 2007).

intermediate goods and outsourcing explain part of the observed increase in demand for skilled workers in both developed and developing countries. Thus, an alternative literature has emerged arguing that the Heckscher-Ohlin model is inconsistent with recent inequality experience around the world, not just related to the fact that inequality increased in developing countries, but also along multiple other dimensions: for example, factor reallocation seems to occur primarily within rather than across sectors (Berman, Bound, and Grilı¨ches, 1994); small change in the prices of unskilled goods relative to skilled goods accompany large changes in the skill premium (Lawrence and Slaughter, 1993). Recent theoretical and empirical studies try to rethink the effects of trade on inequality in the context of heterogeneous firms and provide quite different insights from those observed in the Heckscher-Ohlin model. The contributions here include Egger and Kreickemeier (2009), Verhoogen (2008), and Yeaple (2005), to name a few.

Another channel is the increase in capital flows and complementarity of capital with skilled labour. As the theories are often in terms of endogenous technological change, skill-biased technological change is another explanation for increased demand for skilled labour and increases in skill premium. Put differently, alternative explanations for rising skill premiums are based on the notion that technological change is inherently skill-biased, attributing the observed increases in inequality (including in advanced economies)to exogenous technology shocks (Berman, Bound, and Grilı¨ches, 1994; Berman, Bound, and Machin, 1998). One explanation of how the spread of technology may affect inequality is that technology may increase capital intensity in production, thereby increasing the returns to capital and the relative income of capital owners (Krusell and others, 2000, for an analysis of the impact of capital-skill complementarity). Any empirical estimation of the overall effects of globalization therefore needs to explicitly account for changes in technology in countries, in addition to standard trade-related variables. Openness to trade is also expected to affect labour income through transitional unemployment; industry wage; uncertainty and labour market standards. It should be noted therefore that the link between trade openness skill biased technological change and income inequality operate through labor income.

Two more channels through which trade may affect income distribution, in addition to labour markets effects, are proposed: household production and consumption (Davis and Mishra 2007;Winters et al. 2004; Nissanke and Thorbeke, 2007). This is about the link between world prices and trade (policy), and the prices of the goods that poor households consume and produce. These channels are very relevant in poor developing countries where the poor are employed, if at all, in either subsistence agriculture or the informal sector and

their consumption and sources of incomes are directly affected by prices changes induced by international trade. Not much empirical evidence exists in this area. Most of the focus, both in theory and empirics, has been on the two channels, that is, changes in labour income, particularly Stolper-Samuelson effects and changes in the skill premium.

Much of empirical evidence on link between trade openness and income distributions has been either on cross-country regressions or country case studies. While cross-country regressions are based on aggregate data, some case studies are based on aggregate while others on micro data. Harrison (2006) and Sala-i-Martin (2007) summarize the cross-country empirical evidence, while Goldberg and Pavcnick (2004, 2007) review country case studies. For most of the channels reviewed they found empirical evidence that suggests that trade openness has been associated with increasing inequality in developing countries. Which contradicts HO - SS that depends on relative factor abundance rather than income, and few if any poor countries are covered. For developed countries trade has tended to reduce inequality as the income dispersion has been falling. Easterly (2007) and Milanovic and Squire (2004) on their study found that increasing trade openness is associated with falling inequality within developed countries and greater inequality within developing countries.

More recently, a couple of studies have looked at the complex relationship among globalisation (trade openness, financial liberalization, and technology), growth, income distribution and poverty. Some of the findings are: whereas trade globalization is associated with a reduction in inequality, financial (foreign direct investment in particular)and technology globalization is associated with an increase in inequality, and that there is a conditional relationship between trade openness and inequality (Jaumotte, et al. 2014; Lee, 2013).

Among the few studies that explicitly consider how trade policy affects household welfare directly through micro channels, Goldberg and Pavcnik (2004) investigate the impact of reductions in average tariffs in Colombia between 1984 and 1988 on a variety of urban labour market outcomes. Topalova (2004) includes household production in the relationship between trade reforms and inequality to derive measures of inequality and poverty from household expenditures to estimate the impact of trade reforms in India. Hanson (2004) explore the differences in outcomes for individuals born in Mexican states with high exposure to trade openness to those born in states with low exposure to trade openness between 1990 and 2000. Goh and Javorcik (2004) examine the relationship between tariff changes and wages of workers in Poland. Unlike Colombia and India that found that gains from trade reforms were less likely, the evidence for Mexico and Poland suggests that the

gains from trade reforms were more likely to benefit the poor. Krivonos and Olarreaga (2006) examines the effect of policy change in the Brazilian sugar industry on labour incomes and find that workers in the sugar sector and sugar producing regions experience larger income gain due to higher wages relative to other regions and other industries.

Wages are not the primary source of income for many households in developing countries, especially the rural poor. Ashrafet al. (2004) explores the impact of liberalizing Mexico's corn market on the incomes of rural farmers. They find that the majority of the poorest corn farmers are net consumers of corn and hence benefited from the drop in corn prices, unlike the middle income farmers who are mostly net sellers hence suffered a fall in income. In their study of rural grain producers, McMillan and Levinsohn (2004) show that the net impact of food aid on the poor in Ethiopia has been positive. Balat and Porto (2004) estimates the impact of liberalizing the market for maize, which was heavily subsidized for both consumers and producers, in Zambia. They measure the potential increase in income due to switching from production for home consumption to production and wage activities associated with production of cash crops, and identify substantial gains from expanding into production of cash crops– cotton, tobacco and maize.

Growth and Income Inequality: The analysis of the link between growth and inequality has a long tradition in economics, mainly concerned with a potential trade-off between reducing inequality and improving growth, or whether there exists a virtuous circle in which growth leads to lower inequality, with lower inequality in turn leading to faster growth. Thus, the relationship may go from growth to inequality and from inequality to growth.

Kuznets (1955) was the first to articulate the mechanism by which growth affects income inequality; inequality tends to rise in the early stages of economic development and then fall, hence the inverted – U hypothesis. Kuznet composed data from three developed countries-USA, Germany and Britain and according to his hypothesis, income inequality increases in the initial phase of development and then decreases in the course of development. Though early cross-country studies gave strong support to this hypothesis, recent studies have called these findings into question.

As the result there are different channels through which income inequality affects growth rates. Kaldor (1957) suggests that marginal propensity to save of the rich is higher than that of the poor, implying that a higher degree of inequality will yield higher aggregate savings, higher capital accumulation, and growth. Sain-Paul and Thierry (1993) argue that in

more unequal societies, the median voter will elect a higher rate of taxation to finance public education, which will increase aggregate human capital and economic growth. In contrast, Persson and Tabellini (1994) and Alsenia and Rodrick (1994) emphasize the four main channels through which income inequality lowers growth rates. First, the impact of inequality on encouraging rent-seeking activities that reduce the security of property rights; second, unequal societies face more difficulties in collective action - possibly reflected in political instability, a propensity for populist redistributive policies, or greater volatility in policies - all of which can lower growth; third, the median voter in a more unequal society is relatively poorer and favors a higher (and thus more inefficient) tax burden; fourth, to the extent that inequality in income or assets coexists with imperfect credit markets, poorer people may be unable to invest in their human and physical capital, with adverse consequences for long-run growth.

Because of these different channels, empirical studies on the effect of income inequality on economic growth have yielded different results, resulting in three main positions. In the first group, Deininger and Squire (1996) using the data for 108 countries over the period 1960-1974 found no systematic relationship between growth and changes in aggregate inequality. The simple relationship between current as well as lagged income growth and the change in the Gini coefficient is insignificant for the whole sample as well as for sub samples defined in terms of country characteristics like rich or poor, equal or unequal, fast-growing or slow-growing economies, suggesting no strong relationship between growth and changes in aggregate inequality. Similar results have also found by Lee and Roemer (1998), Castelló and Domenech (2002) and Panizza (2002) who find no correlation at all or find inconclusive evidence of any correlation between inequality and economic growth (see Charles-Coll, 2013).

The second group found positive relationship between inequality and growth. This include that Kaldor (1956), Partridge (1997), Forbes (2000), Garbis (2005). Nahum (2005) that found inequality does lead to growth. While finding a positive effect, Banerjee and Duflo (2003), Pagano (2004), Voitchovsky (2005), Barro (2008), and Castelló-Climent (2010) propose a sign changing nonlinear relationship.

The third group of studies, which is also dominant view today, found negative relationship between growth and inequality. The argument in this group is that inequality is not a final outcome of growth but plays a central role in determining the rate and pattern of growth (Bourguignon, 2004). Thus, according to the results of Galor and Zeira (1993), Perotti(1993), Persson and Tabellini (1994), Alesina and Rodrik (1994), Clarke (1995),

Birdsall et al. (1995), Alesina and Perotti (1996), Castelló-Climent (2004), Knowles (2005), Davis (2007), and Pede et al. (2009), initial inequality seems to be empirically associated with lower growth rates.

More recently, findings that inequality is damaging to economic growth are also supported by IMF, who argued that countries with high levels of inequality suffered lower growth than nations that distributed incomes more evenly. IMF finding warned that inequality can also make growth more volatile and create the unstable conditions for a sudden slowdown in GDP growth. Further, analysis of various efforts to redistribute incomes showed they had a neutral effect on GDP growth (Ostry, et al, 2014). Ncube, et al. (2013) also investigated the effect of income inequality on economic growth and poverty in the MENA and their empirical results showed that income inequality reduces economic growth and increases poverty in the region.

A number of reasons have been put forward for these mixed results. The results are sensitive to the specific choice of sample of countries; to the use of different type of inequality data sources, different specifications, and estimation methods (Barro, 2000).

3. Empirical and Threshold-Interaction Effect Model

Model Specification

To explore the empirical pattern in the data, in addition to descriptive statistic that analyze the recent patterns and trends, this section provides the empirical specification to investigate and assess any evidence of a link between growth, exports and inequality. As there is no particular reason to posit a clear relationship between trade (exports) and inequality, and as inequality can be considered a proxy for 'governance quality', we also test for a threshold in inequality for the effect of trade (exports) on growth. This also will be extended to test for a threshold in inequality for the effect of trade (exports) on poverty. To estimate the effects of trade on growth given inequality, we need first to consider the direct effects of inequality on growth and then that of trade on growth.

As a result of the work by Levine and Renelt (1992) that searched for a set of robust variables to model growth based on endogenous growth theory of Romer (1986, 1990) and Lucas (1988), there is a agreement that growth models should control for: initial per capita GDP, physical capital, human capital and population growth. This is because the ultimate drivers of per capita growth are technological progress and per capita growth of human and physical capital. Thus, in a standard growth specification, economic growth is regressed on

this set of control variables. Hence, the most commonly estimated cross-country reduced form model follows the specification of Barro (1991) and Mankiw, et al. (1992):

$$y_{it} = \alpha + x'_{it}\beta + s'_{it}\gamma + \mu_{it} \qquad (1)$$

We follow this approach where y_{it} is the as growth rate of real GDP per capita. x_{it} is a vector of explanatory variables mentioned above: $ln\,GDPO_{it}$ - initial income measured as log of real GDP per capita; often used to capture conditional convergence, as per capita growth rate is expected to be inversely related to the starting level of income per capita (but this may also capture country-specific effects). SEC_{it} -Secondary school enrolment (percent gross), either initial or the average, is used to proxy human capital. INV_{it} - Gross capital formation (percent of GDP), measures physical capital, which is an essential element in the growth process, as it enlarges the economy's capacity to produce. By controlling for human and physical capital both of which are considered a positive factor in stimulating economic growth, this specification is implicitly assuming that trade and inequality affects growth only through total factor productivity (TFP) and not through factor accumulation. $POPNGR_{it}$ - Population growth (annual percent), as growth theories are formulated in per capita (or labour) terms, population is a core variable and is expected to be negative. It is important to control for the impact of other exogenous determinants of growth so as to minimize the likelihood of omitted variable bias (or oversimplification of the model). Thus, in addition to the core determinants of growth in the basic specifications, we also control for inflation ($INFLN_{it}$ - inflation, the percentage change in consumer prices); which is used to represent policy distortion in the economy and thus used as a proxy measure for the growth retarding features of the economy, [7]is expected to have a negative sign.

As noted previously, our empirical model for growth is that trade (and income inequality) exert direct as well as conditional effects on growth. Hence the variables of specific interest in our analysis, denoted by s_{it}, are trade and income inequality which can have direct impacts on growth (γ).Three measures of trade openness are considered: exports over GDP ($XGDP_{it}$), imports over GDP ($MGDP_{it}$) and trade over GDP ($TRADE_{it}$), i.e. (exports plus imports)/GDP. We expect trade and especially exports to have a positive sign,

[7]In an economy where power is concentrated due to political reasons or institutions, distortions are widespread and rent-seeking is prevalent, we may expect to observe relatively high levels of inflation (and relatively poor growth performance), as seen in most of Latin America and Africa in

implying that trade openness is good for growth, while the sign for imports is ambiguous (increased access to imported technology and inputs may be beneficial, but increased competition from imports may have an adverse effect, especially for poor countries), hence can be dropped in this specification. Income inequality is measured by Gini index ($GINI_{it}$ - a measure of inequality between 0 (everyone has the same income) and 100 (richest person has all the income)). From the theoretical and empirical literature, effects of income inequality on growth are inconclusive, some studies have found negative results, others positive and there those which have found no significant correlation.

Though trade is expected to advance economic growth, the effect of trade on inequality, just as of inequality on growth is indeterminate. Theory and empirical evidence have shown that trade can raise per capita income and reduce inequality, especially in developing world (Stolper-Samuelson theorem). Alternatively, by increasing the skill premium, trade can increase income inequality, especially in advanced economies. Trade can also increase inequality both in developed and developing economies due to technology bias. Thus, one can hypothesize in this subtle interrelationship that if trade advances economic growth and at the same time reduces income inequality while income inequality increases growth, then the overall effects of trade on growth would be positive. In another case, even if trade advances economic growth but at the same time increases income inequality, and inequality reduces economic growth, then the overall effect of trade on growth is indeterminate. To allow for such heterogeneity in the trade-inequality-growth relationship we allow for interaction effects (i.e. the effect of trade on growth given inequality) or model the channels through which trade affects growth (the effect of trade on growth through inequality). The contingent model (interaction effects) specification becomes:

$$y_{it} = \alpha + x'_{it}\beta + s'_{it}\gamma + GINI_{it} * TRADE_{it}\delta + \lambda_t + \eta_i + \varepsilon_{it} \qquad (2)$$

$GINI_{it} * TRADE_{it}$ is the interaction terms between inequality or between inequality and export ($GINI_{it} * XGDP_{it}$).

Furthermore, trade might affect growth differently depending on the different levels of income inequality. For example, while many East Asian economies had relatively low levels of inequality and grew at unprecedented rates, many Latin American countries had significantly higher levels of inequality and grew at a fraction of the average East Asian rate. This contingent relationship may be non-linear in nature, as trade affects growth differently given different levels (thresholds) of prior factors. Traditionally the strategy to allow for this

is to model the simple product terms in a polynomial regression by calculating the square of the mediating variables, i.e. income inequality. This is the quadratic interaction effect model.[8] Another approach is arbitrarily exogenous sample splitting done in a number of studies. For comparison purposes, we employ these approaches too. In addition, unlike previous studies, we adopt a more formal approach to the modelling of heterogeneity in the trade-inequality-growth relationship.

Given our *prior* assumption that the effects of trade openness on growth differ across countries based on the countries' level of income inequality, the relationship is discrete in nature. We do not know, however, how the coefficients on the openness variables vary with income inequality. In light of this, we formally apply the endogenous threshold regression technique of Hansen (2000) to estimate the thresholds or cut-off values and the level of confidence we can attach to the position of the threshold to make valid statistical inferences. To allow for nonlinearity due to thresholds, equation (3.3) is extended to the Hansen (2000) endogenous threshold regression sample splitting specifications that are a non-linear two regime threshold regression as:

$$y_{it} = \theta_1' x_{it} + \varepsilon_{it}, q_{it} < \sigma$$

$$y_{it} = \theta_2' x_{it} + \varepsilon_{it}, q_{it} \geq \sigma \qquad (3)$$

As before y_{it} is growth rate and $x_i = (1, s_i', w'_i)$ is a vector of explanatory variables, including both thresholds. The corresponding coefficient vector $\theta_j = (\beta, \gamma, \varphi)$ where j=1, 2 and q_i is the indicator function used to sort the data into different regimes or groups. The threshold parameter is $\sigma \in \Gamma$, where Γ is strict subset of the support of q_i. This model, which also contains an unobservable country-specific effect η_i and time effect λ_t, permits the regression parameters (θ_1 and θ_2) to switch between regimes depending on whether q_i is smaller or larger than the (unknown) threshold value (σ). And the threshold regression model can be described as captured by either of the single threshold variables, where in equation (3) growth is the threshold identifying variable:

[8]Agenor (2004) tested for the nonlinearity in globalisation and poverty relationship using a squared term for globalisation index.

$$y_{it} = \gamma X_{it} + \beta_1 TRADE_{it} I(GINI_{it} \leq \alpha) + \beta_2 TRADE_{it} I(INI > \alpha) + \mu_{it} \quad (4)$$

I (.) is the indicator function used to sort the data; α is the threshold value; this specification also contains an unobservable country-specific effect η_i and time effect λ_t. x_{it} as before is a vector of explanatory variables, including the threshold.

Estimation Methods

To explore heterogeneity in the trade-inequality-growth relationship we estimate variants of the equations derived above: baseline model, linear interaction (contingent) model and non-linear interaction (thresholds) models. There are a number of econometric difficulties to consider here, as estimating equations (1) to (2) could be biased for a number of reasons. First, difficulties in measuring trade and inequality; even simple measures like exports and imports suffer from the fact that both are determined simultaneously with other variables (especially GDP) so there is potential simultaneity bias. Measuring inequality is not without challenges, should it be based on consumption or income measures, or other measures of inequality other than income inequality (Deaton, 2003; Ravallion, 2003).[9] Omitted variables bias such as unobserved country specific effects is another problem, and the potential endogeneity of trade and trade policy besides the persistence in series must also be allowed for.

To allow for most of these econometrics difficulties, that is measurement errors in variables, omitted variable biases, simultaneity biases, and any endogeneity due to any factor, we adopt the standard estimators. First we run the regression using simple pooled OLS, but this does not allow for individual country heterogeneity and time effects. To allow for both of these, we specify Fixed Effects (FE) or Random Effects (RE). With panel data, the FE or RE estimator has the ability to control for both unobserved country specific and time effects, which could be correlated with observed regressors, thus ensuring consistent and unbiased estimation for our parameters of interest. Although a systematic choice between FE and RE models is guided by performing the Hausman test, where rejection or non-rejection does not imply the adoption or rejection of one of the models; in this study we adopt RE estimator based on the fact that some of variables in our specification, such as initial level of

[9]Issues include: the coverage of income sources and taxes tend to vary both across countries and, for a specific country, across years; the increase in the non-response rates of the richer households biases estimates; the household surveys used are often redesigned such that the data are not comparable across years or across countries.

development or region dummies, are fixed in nature and using FE omits them automatically (Baltagi, 2001; Hsiao, 1986).

More critically, variables such as trade openness and investment are more likely to be endogenous due both to simultaneity bias and persistence in series, calling for the use of instrument variables (IV); but getting credible IV is difficult, giving rise to the problems involved with weak instruments. Further, evidence shows that dynamic adjustments are quantitatively very important in studies related to growth. To address these concerns studies typically estimate a dynamic panel specification with growth and all variables averaged over 5 year sub-periods to reduce large variations in the data and the effects of business cycles, hence our panel model is dynamic in nature and thus becomes:

$$y_{it} = \alpha y_{it-1} + x'_{it}\beta + s'_{it}\gamma + \eta_i + \lambda_t + \varepsilon_{it} \qquad (5)$$

where y_{it-1} is lagged dependent variable, the dynamic component (captured by the variable $ln\,GDPO_{it}$). Once we introduce the dynamic element in the relationship as is the case with (5), the standard unbiasedness and consistency results underlying OLS and FE/RE models no longer apply. A different technique is required to overcome all these difficulties. As noted, one way to address problems of endogeneity is to use instrumental variables (IV).To combine the instruments in an efficient way, Arellano and Bond (1991) propose the use of Hansen (1982) Generalized Method of Moments (GMM), which is computed in two steps. Thus, among the alternative set of instruments, GMM estimator is an IV estimator that uses lagged information optimally to account for the serial correlation among the disturbances caused by the dynamic (Holtz-Eakin *et al*. 1988; Arellano and Bond, 1991; Arellano and Bover 1995; Blundell and Bond 1998). The gain in efficiency from GMM is considerable, and it is for this reason system GMM is our preferred estimator, as it addresses problems of measurement errors, omitted variables bias, persistence in series and endogeneity (Blundell and Bond, 1998). For comparison purposes we estimate the base model and linear interaction (contingent relationship) model using pooled OLS, FE/RE and system GMM estimators.

The non-linear interaction model is then estimated by applying the Hansen (2000) endogenous threshold regression technique that locates the thresholds, tests for their significance and constructs their confidence intervals, as specified in equations (3) and (4).In estimating equations (3) and (4) three main econometric and statistical problems arise and three procedures are adopted for resolving them. In the first step, we follow Hansen (2000) to

eliminate the individual effects in our model. Then the threshold value and the slope parameters are jointly determined after the transformations. This is done by applying the algorithm provided by Hansen (2000) that searches over values for α sequentially until sample splitting value $\hat{\alpha}$ is found (i.e. least squares estimations through the procedure of minimizing the concentrated sum of square errors, as recommended by Chan (1993) and Hansen (1999, 2000)). Once found estimates of γ, β_1 and β_2 are easily provided.

The second step is to test the statistical significance of the threshold effects. More specifically, to test the null hypothesis of no threshold effect: $H_0 : \beta_1 = \beta_2$ against the alternative hypothesis of having at least one threshold: $H_1 : \beta_1 \neq \beta_2$. A problem arises in testing the null hypothesis of no threshold effects (that is, a linear formulation) against the alternative of threshold effects, as under the null hypothesis the threshold variable is not identified. Hence, classical tests such as the Lagrange Multiplier (LM) test do not have standard distributions and so critical values cannot be read off standard χ^2 distribution tables. To address this problem, Hansen (2000) recommends a bootstrap procedure to obtain approximate critical values of the test statistics which allows one to perform the hypothesis test. Thus we follow Hansen (2000) and bootstrap the p-value based on the likehood ratio (LR) test. The null hypothesis of no threshold effect is rejected if the bootstrap estimate of the asymptotic p-value for this likelihood ratio test is smaller than the desired critical value.

Once we find a threshold (i.e. $\beta_1 \neq \beta_2$), the last step is to construct confidence intervals for the threshold value and slope coefficient. We test the null hypothesis: $H_0 : \alpha = \alpha_0$, against the alternative hypothesis: $H_0 : \alpha \neq \alpha_0$. This enables us to attach a degree of certainty as to the threshold for a country with a given level of income inequality. Under normality, the likelihood ratio test statistic $LR_{n(\alpha)} = n\dfrac{S_n(\alpha) - S_n(\hat{\alpha})}{S_n(\hat{\alpha})}$ is commonly used to test for particular parametric values. Hansen (2000) proves that when the endogenous sample-splitting procedure is employed, $LR_{n(\alpha)}$ does not have a standard χ^2 distribution, so derives the correct distribution function and provides a table of the appropriate asymptotic critical values.[10] The null hypothesis is rejected if the likelihood ratio test statistic exceeds the desired critical value (we want them to be reasonably small). After the confidence interval for the threshold value is obtained, the corresponding confidence interval for the slope

[10]See Table 1 on page 582 of Hansen (2000).

coefficient can also be easily determined because the slope coefficient and the threshold value are jointly determined.

Equations (3) and (4) assume that there exist only single thresholds; similar procedures can be conducted to deal with the case of multiple thresholds. This possibility of existence of more than one threshold represents another advantage of this method over the traditional approaches, which allow for only a single threshold. We allow for the possibility of multiple thresholds in our estimation. To see what the threshold effects mean given income inequality as threshold identifying variable, if $\beta_2 > 0$ and $\beta_2 > \beta_1 > 0$ it implies that higher economic growth effects of trade openness for those countries with above the threshold level of inequality and lower economic growth effects for those with below threshold inequality.

Data Sources and Descriptions

The sources for the most of data and definitions used in this study are provided in Appendix Table A.2. Most data come from World Bank World Development Indicators, with the income inequality and poverty for developing and emerging economies from World Bank *PovCal* database and for advanced economies from Luxembourg Income Study (LIS) database. Both of these inequality databases allow more within and across country comparisons than available elsewhere. Appendix Tables A.3 and A.4 give both summary statistics and correlation matrix. Descriptive statistics that include data plotting and data analysis are in section 4.

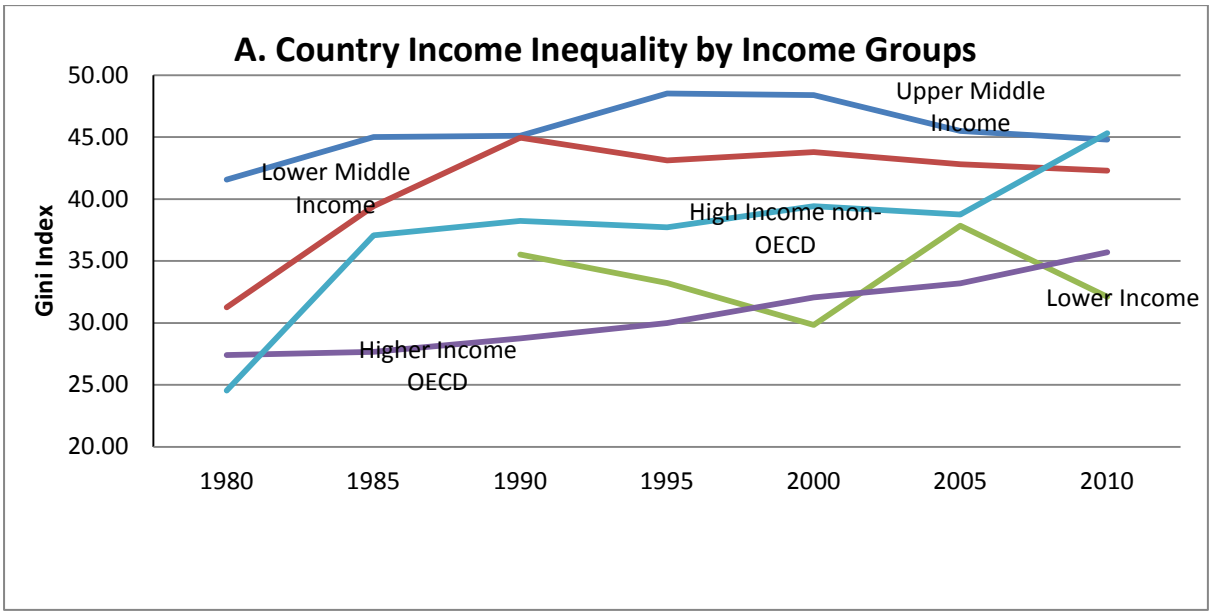
4. Trends and Patterns in Income Inequality, Trade, Growth and Poverty

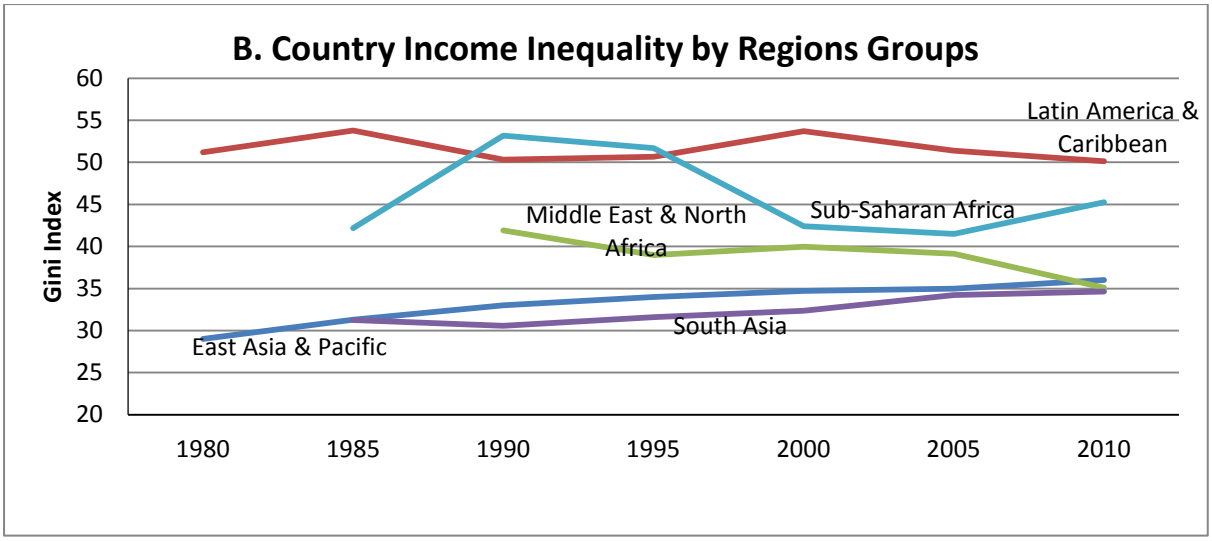
This section provides evidence on the recent trends and pattern on income inequality, trade openness, economic growth and poverty. This is first done by comparative analysis on income and regions country groups, and then for few selected countries in advanced, emerging and developing economies.

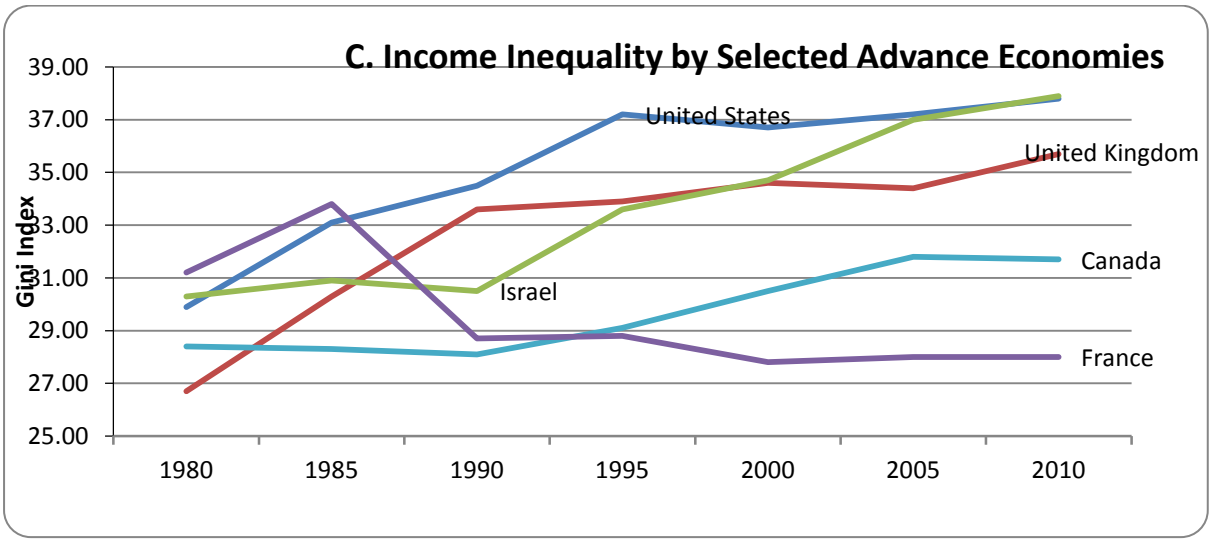
Appendix Table A.5 summarizes the trends in the main variables for each region, between 1980 and 2010. East Asia that have achieved highest GDP growth rate, on average 7percent per annum, compared to other regions, have also experienced the huge poverty reduction over the past 30 years, from 77.7percent in end of 1970s to 12.8 percent in second part of 2000s. South Asia, which grew on average at same rate as East Asia (6percent per annum), has only seen a modest fall in poverty, from 59.4percent to 50.8percentin the same period. Those regions which experienced low or less GDP growth rate, Middle East and

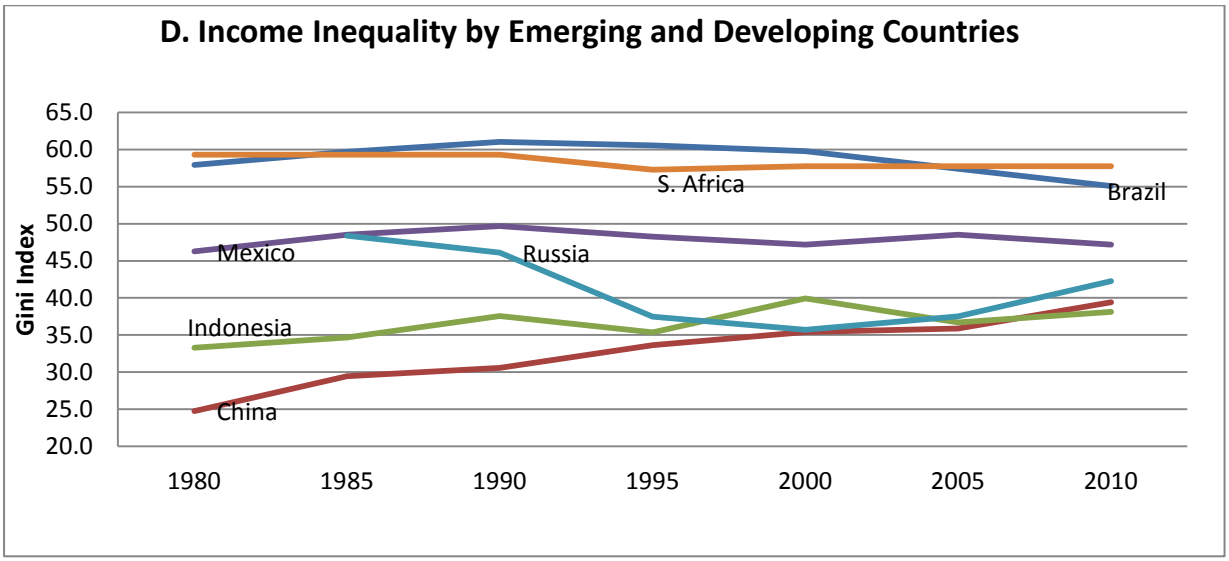
North Africa (MENA), Latin America, SSA and OECD countries, have seen no significant fall (and sometimes worsening)in levels of poverty rate. For example, Latin America, as it is for SSA, which on average has been growing at 3 percent has experienced persistent high level of poverty of around 12percent, fall from 12.8percent in end of 1970s to 7percent in first half of 2000s. SSA, the most poorly performing region, despite the recent good economic growth rate, has experienced persistent poverty levels of around 55.5percent, with poverty falling from 53.4percent in end of 1970s to 47.51percent in second half of 2000s. MENA, which had the lowest poverty from the beginning and experiencing low growth rate, on average around 3percent per annum, has seen reasonable poverty reduction from 7.9percent in end of 1970s to 3.6percent in second half of 2000s. OECD countries on contrary, experienced low growth rate and poverty have slightly worsened, from 16percent in 1980s to 20percent in end of 2000s (the recent economic and financial turmoil are part to blame). Exports and trade as share of GDP have increased significantly during this period for all of the six regions.

Figure 1: Inequality Within Income and Regions Groups and Some Selected Countries









Source: Authors owns Compilation

Though most regions have experiencing high economic growth rates, significant rise in share of exports and trade to GDP, with few regions experiencing significant reduction in poverty, income inequality have worsened almost for all country groups. As shown, both in Figure 1 and Appendix Table A.5, income inequality has rise in all income groups from 1980s to 2000s. However, it has risen much more in the high income countries, both in OECD (from 27 to 37 percent) and non-OECD (24 to 45 percent) countries, so is to upper and lower middle income countries (see Figure 1.A). There is a slightly fall in income inequality for low income countries. Nearly, the same pattern is observed in Figure 1.B when we group countries by regions, with some regions like East Asia expiring falling and rising inequality, South Asia and SSA experiencing slight rise in income inequality, MENA have seen a fall and Latin America have retained high level of income inequality.

When we decompose the entire sample into individual countries, a mixed picture emerged. Much as there are many countries that has experienced significant rise in income inequality, especially in the advanced economies, there are those which have not and others which have experienced fall in income in inequality. Some countries in advanced economies that include United Kingdom, United States, Sweden, Poland, Netherlands, Luxembourg, Italy, Israel, Germany, Finland, Canada, Belgium and Austria has experienced substantial rise in income inequality. Others such as Australia, Denmark, Norway and Spain have only experienced very marginal or no change, while courtiers like France, Switzerland and Ireland has seen income inequality falling. The same stories can be extended when looking at individual countries in the emerging and developing economies. While for instance China and Indonesia have been experiencing rising income inequality, Brazil and Russia are experiencing falling in income inequality, but income inequality in Brazil, South Africa and Mexico have remained very high and stagnant.

To get the feel of our sample data, we plot, summarize and explore correlations among the key variables as shown in Appendix TablesA3 and A4, for the whole period (1975 to 2010)and for the entire sample. The correlation matrix and plots show that income inequality reduces growth, while exports and trade promote growth. At the same time while exports reduces inequality, trade as whole increase inequality. Most of other variables have the expected signs. For instances, initial level of development and population growth reduces growth as expected, while investment and secondary education promote growth. Whereas population growth and income inequality increase poverty, initial level of development, investment, secondary education, exports and trade reduces poverty.

5. Results and Discussion

Base Model

Table 2: Determinants of Cross-Country Growth: Baseline Specification

	POLS (1)	RE (2)	SYSGMM (3)	POLS (1)	RE (2)	SYSGMM (3)
lnGDPO	-0.545*** (-4.385)	-0.353** (-2.291)	-0.700*** (-4.136)	-0.294** (-2.310)	-0.345** (-2.293)	-0.970*** (-5.359)
lnPOPLN	-0.730*** (-5.685)	-0.677*** (-3.969)	-0.834*** (-5.917)	-0.347** (-1.997)	-0.335** (-2.204)	-0.512*** (-5.053)
SEC	0.012** (1.995)	0.001* (1.710)	0.022*** (4.450)	0.009 (1.216)	0.005 (1.655)	0.040*** (4.590)
INV	0.167*** (9.402)	0.168*** (9.780)	0.156*** (6.331)	0.158*** (8.334)	0.165*** (9.258)	0.155*** (8.251)
GINI				-0.023** (-2.316)	-0.024** (-2.056)	-0.034** (-2.074)
CONS	1.832* (1.813)	0.863 (0.776)	3.049** (2.463)	1.917 (1.502)	1.283 (0.991)	6.471*** (4.208)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
BreuschPagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.115			0.196
R^2(overall)	0.31	0.30		0.29	0.31	
N	534	534	534	528	528	528

Notes: POLS is pooled OLS, RE is Random Effects and SYSGMM is the system GMM. Figures in parentheses are t-ratios: *** denotes significant at 1percent, ** significant at 5 percent and * significant at 10 percent. The F-test supports the hypothesis that all coefficients are jointly significant (i.e. rejects the null that all are zero). The Breusch Pagan (BP) heteroscedasticity test reveal no evidence of heteroscedasticity, as we reject the null hypothesis and conclude that random effects is appropriate. To evaluate whether our models are correctly specified and whether our instruments are valid, we use two criteria: the test for first/second order serial correlation of the residual in differenced equation *((AR (1)/m1 a*nd *AR (2)/m2)*. The former is the Sargan/Hansen test for over-identifying restrictions, which, under the null of instrument validity, is asymptotically distributed as a chi-square with degrees of freedom equal to the number of instruments less the number of parameters. If the model is correctly specified, the variables in the instrument set should be uncorrelated with the idiosyncratic component of the error term e_{it}. The *AR (2)/m2* test is asymptotically distributed as a standard normal under the null of no second-order serial correlation, and provides a further check on the specification of the model and on the legitimacy of variables dated *t*-2 as instruments. In order for the instruments to be acceptable, the p-values for the Sargan test and the *AR (2)/m2* test should both be greater than 0.05.The *AR (1)/m1* test is asymptotically distributed as a standard normal under the null of no firs-order serial correlation. According to Arrelano and Bond (1991), the GMM estimator requires that there is first-order serial correlation (*AR (1)/m1*) but no second-order serial correlation (*AR (2)/m2*) in the residuals; hence the p-values for the *AR (1)/m1* test should be less than 0.05. All support the fact that these models are correctly specified.

The (parsimonious) base regression results are in Table 2 in Columns 1 – 3, and includes initial income, annual population growth rate, secondary education and gross capital formation (investment) as determinants of growth. In all three estimators, that is the Pooled OLS (POLS), Random Effects (RE) and System GMM (SYSGMM) models, all variables, have the expected signs and most are significant. RE is selected over Fixed Effects (FE) model for two reasons. One, the relationship between trade, inequality and growth potentially suffers from omitted variables that are due to differences across countries but constant over time (i.e. fixed effects) and those which are fixed across countries but vary over time (i.e. between effects). Secondly, variables like *lnGDPO* are effectively fixed, so when FE model is used these are dropped. Hence, RE is used as a weighted average of fixed and between effects. Any effect that appears to be country-specific is captured by random effects. The system GMM estimator is our preferred technique because, besides controlling for measurement errors, heterogeneity and endogeneity biases that are inherent in our covariates, it also addresses the persistence in our panel series.

Table 3: Determinants of Cross-Country Growth, with Trade Openness and Inequality

	POLS	RE	SYSGMM	POLS	RE	SYSGMM
	(1)	(2)	(3)	(1)	(2)	(3)
	-0.529***	-0.394**	-1.141***	-0.521***	-0.384**	-1.075***
lnGDPO	(-4.291)	(-2.574)	(-12.399)	(-4.257)	(-2.519)	(-12.751)
	-0.616***	-0.561***	-0.654***	-0.620***	-0.563***	-0.785***
lnPOPLN	(-4.600)	(-3.211)	(-13.687)	(-4.632)	(-3.218)	(-6.833)
	0.011*	0.001	0.044***	0.011*	0.002	0.041***
SEC	(1.722)	(0.188)	(9.580)	(1.772)	(0.226)	(8.239)
	0.153***	0.156***	0.089***	0.154***	0.155***	0.107***
INV	(8.285)	(8.839)	(6.284)	(8.278)	(8.743)	(9.428)
	-0.018*	-0.022*	-0.031***	-0.018*	-0.021*	-0.035***
GINI	(-1.838)	(-1.765)	(-3.784)	(-1.852)	(-1.737)	(-3.603)
	0.010*	0.011*	0.011**	0.001	0.002	0.009***
XGDP / TRADE	(1.853)	(1.734)	(2.244)	(0.282)	(0.654)	(2.961)
	2.694**	2.303*	8.036***	2.664**	2.264*	6.316***
CONS	(2.394)	(1.868)	(7.896)	(2.355)	(1.835)	(8.211)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
Breusch Pagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.157			0.203
R^2 *(overall)*						
r2	0.29			0.29		
N	526	526	526.	226	5526.	526

Note: As in Table 2

The coefficient on initial income, which captures both country specific effects and conditional convergence, is negative and significant, implying that poor countries are catching up with rich ones. Secondary education and investment is good for economic growth as expected, as their coefficients are positive and statistically significant for all three estimators. As expected, the coefficient on population growth is negative and statistically significant, implying that population growth is bad for economic growth. Our baseline empirical model therefore behaves as what found in many other empirical studies.

Given rising income inequality, even in the emerging and developing economies, most of which have been experiencing high economic growth over the past two decades, we introduce income inequality in the baseline regression model, Colum 4 - 6. Though some studies have found positive significant effects and others no effects, like a good number of other studies, this study find negative significant effects of inequality on economic growth, suggesting that rising income inequality is bad for economic growth, both in advanced and developing economies. The findings that inequality is damaging to economic growth are also supported by IMF, who argued that countries with high levels of inequality suffered lower growth than nations that distributed incomes more evenly. Further, the IMF discussion paper warned that inequality can also make growth more volatile and create the unstable conditions for a sudden slowdown in GDP growth. According to the paper, analysis of various efforts to redistribute incomes showed a neutral effect on GDP growth (Ostry, et al, 2014). Ncube, *et al.* (2013) also investigated the effect of income inequality on economic growth and poverty in the MENA region and their empirical results showed that income inequality reduces economic growth and increases poverty in the region.

As the focus of this study is also on the effects of exports and trade on economic growth conditional on levels of income inequality, we first test for the direct effects of trade openness on economic growth. As shown in Appendix Table B.1 and Table 3, as in many other empirical studies, openness to trade do advance economic growth. There are however, no particular reason to posit a clear relationship between exports (trade) and income inequality. More recently, a couple of studies have looked at the complex nexus among globalisation (trade openness, financial liberalization, and technology), growth, income distribution and poverty. Some of the findings are: whereas trade globalization in term of trade openness is associated with a reduction in inequality, financial and technology globalization is associated with an increase in inequality, and that there is a conditional relationship between trade openness and inequality (Jaumotte, et al. 2014; Lee, 2013). The correlation matrix in this study shows that exports reduce inequality while trade increases it.

Linear Interaction Effects

Assuming that the effect of trade (exports) on economic growth varies depending on the level of inequality, so, we hypothesize that the relationship between trade (exports) and growth is moderated by the level of income distribution. The most common approach is to use the simple product term (traditional product term). Thus, our reduced form specification uses product terms to allow for interaction effects, where inequality is embedded as a variable that mediates the relationships between trade and economic growth. To estimate the simple interaction effect of model 2 and ensure a meaningful interpretation, we transformed our mediating variable - inequality. This is done by mean centring inequality to create a new scale for our mediating variable. Then we re-estimate the traditional product term of model 2 with its transformed mediating variables such that our coefficient of interest γ is the predicted effects of trade on growth when income inequality equals its sample mean. This is the marginal impact of trade on growth, which can be derived from 2 as:

$$\partial y_{it} / \partial s_{it} = \gamma TRADE + GINI_{it} * TRADE_{it} \delta \quad (10)$$

Table 4 presents the linear interaction effects between exports and inequality in Columns 1 –3, and trade and inequality in Columns 4 – 6, allowing for the effects of exports (trade) on growth conditional on inequality. The interaction effects are treated in similar way for GMM and RE as for OLS estimator. The fact that the coefficient on exports and trade are negative and statistically significant, while that of interaction effects is positive and statistically significant, implies that trade openness measures lower economic growth at higher values of income inequality. This suggests that, the beneficial impact of increase trade openness on economic are lower when the values of income inequality are higher, and the opposite holds. In other words, more openness results in lower growth rate when inequality is higher. These results are however sensitive to the size of the sample used, and when allowing for outliers in the sample, as shown in Appendix Table B.2.The positive and to less extent significant effect of trade openness measures on growth given inequality, while their interaction effects are positive and statistically significant seem to suggest that though rising income inequality tend to lower economic growth, at the same time, as found in some latest empirical studies trade openness also lower income inequality (Jaumotte, et al. 2014; Lee, 2013) such that its effects on growth given inequality will be positive; since in one hand will be enhancing economic growth while at another hand will be reducing income inequality.

Table 4: Determinants of Cross-Country Growth, with Interaction Terms

	POLS (1)	RE (2)	SYSGMM (3)	POLS (1)	RE (2)	SYSGMM (3)
lnGDPO	-0.525***	-0.335**	-1.137***	-0.522***	-0.331**	-0.966***
	(-4.264)	(-2.097)	(-15.353)	(-4.281)	(-2.084)	(-17.378)
lnPOPLN	-0.673***	-0.604***	-0.904***	-0.657***	-0.596***	-0.965***
	(-4.896)	(-3.422)	(-18.823)	(-4.830)	(-3.368)	(-11.131)
SEC	0.011*	-0.001	0.033***	0.012**	-0.000	0.028***
	(1.783)	(-0.069)	(10.044)	(1.960)	(-0.011)	(10.502)
INV	0.158***	0.160***	0.083***	0.159***	0.159***	0.084***
	(8.860)	(9.191)	(14.126)	(8.848)	(9.010)	(13.736)
GINI	-0.059***	-0.068***	-0.111***	-0.058***	-0.070***	-0.104***
	(-3.220)	(-2.939)	(-7.734)	(-3.003)	(-2.769)	(-5.937)
XGDP /TRADE	-0.046**	-0.048*	-0.062***	-0.024**	-0.024*	-0.036***
	(-2.363)	(-1.915)	(-4.271)	(-2.354)	(-1.950)	(-4.398)
*GINI*XGDP/GINI*TRADE*	0.001**	0.001**	0.002***	0.001**	0.001**	0.001***
	(2.563)	(2.248)	(5.938)	(2.409)	(2.089)	(5.641)
CONS	1.833*	0.814	7.538***	1.840*	0.817	6.394***
	(1.805)	(0.720)	(14.634)	(1.808)	(0.722)	(15.802)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
Breusch Pagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.167			0.263
R^2 *(overall)*	0.33			0.32		
N	526	526.	526.	526.	526.	526

Note: As in Table 2

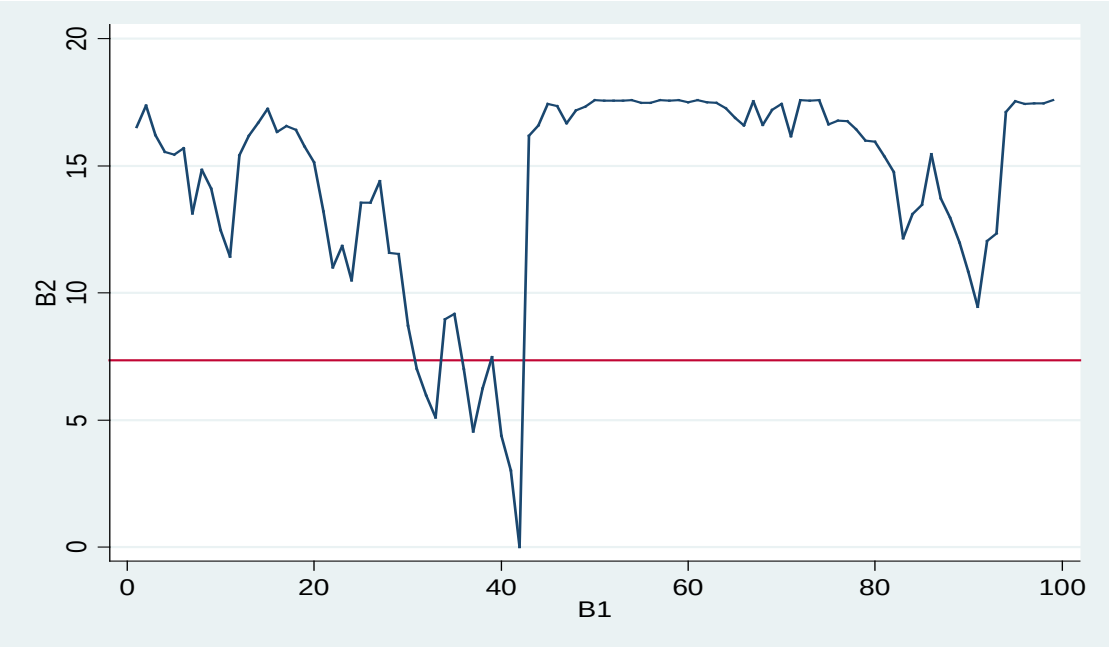
Allowing for Non-Linear Interaction Effects

An important thing to note here is that, the traditional product term test only for a bilinear interaction effects and failure to obtain a statistically significant interaction effects may signal the presence of alternative function form. Thus, in addition, trade affects economic growth differently given the different level of income inequality. For that reason, linear interaction terms used above may be miss-specified so we now employ the Hansen (2000) endogenous threshold regression technique. Here we are treating *GINI* as the threshold identifying variable for *XGDP* in Figure 1.A (the same has been done for *TRADE* in Figure 1.B*)*, that is, we search for a threshold where the relationship between *GINI* and *XGD* or *TRADE* changes (previously we conditioned the interaction on the mean value of *GINI* so in effect we are refining that decision).

Using inequality as our identifying variable in the trade -growth relationship and applying Hansen's technique, many cut off points are identified. But only two breaks at the 45th percentile (when the focus is on exports, as shown in Figure 2.A) and95th percentile (when the focus is on trade, as shown in Figure 2.B) are significant. Denoting the percentiles of inequality to exports (or trade)*(XGDP/TRADE)* by α , the 95% confidence interval for the threshold estimates is obtained by plotting the likelihood ratio sequence in α , $LR_{n(\alpha)}$, against α and drawing a flat line at the critical value (e.g. the 95% critical value is 7.35). The segments of the curve that lie below the flat line are the 'no rejection region', that is the confidence interval of the threshold estimate.

Figure 2: Endogenous Sample Splitting - Formal Threshold Model

2. A: 95 % Confidence Interval for the Inequality as Threshold Variable: Exports



Since only a small portion lies in the 'no rejection region', these thresholds are significant. Other cut-off values are either marginally significant or insignificant; the 95% confidence intervals for those thresholds are wide and encompass most of the region below the flat line at the critical value. As a result we are less sure in these cases as to where the 'true' value at which the break-point in parameter lies. We consider the effect of the significant threshold in Table 5 for when the inequality is below the threshold 45percentiles and in Table 6, for when inequality is above the threshold 45 percentiles, both for exports and trade.

2. B: 95 % Confidence Interval for the Inequality as Threshold Variable: Trade

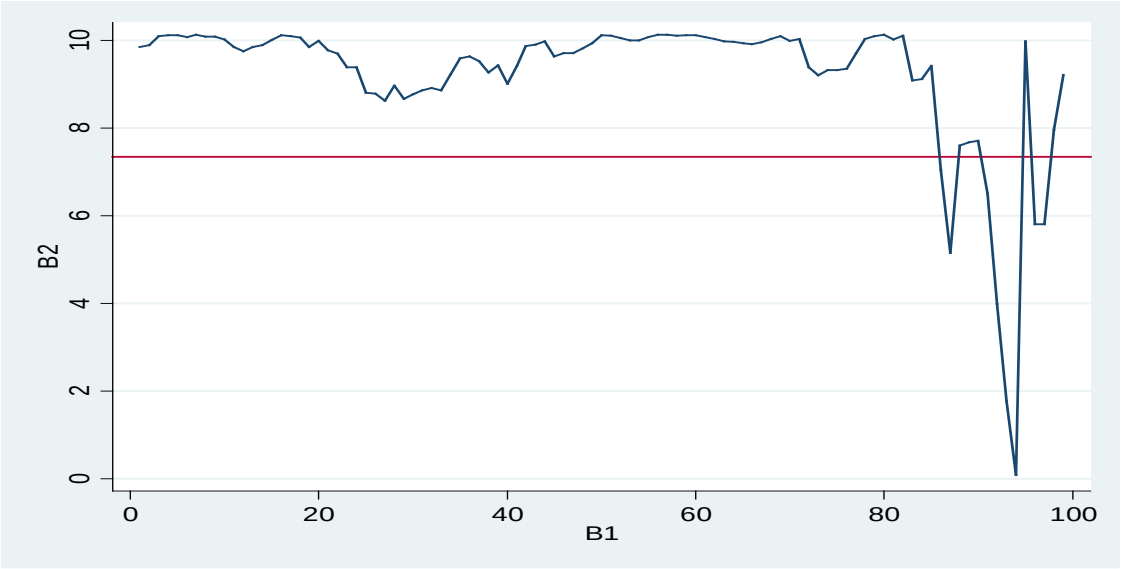


Table 5: Endogenous Threshold Regression Estimates: Inequality is below the Threshold

	POLS (1)	RE (2)	SYSGMM (3)	POLS (1)	RE (2)	SYSGMM (3)
			GINI<=45 percentile			
lnGDPO	-0.581***	-0.479***	-0.624***	-0.572***	-0.468***	-0.594***
	(-5.205)	(-3.589)	(-14.089)	(-5.140)	(-3.495)	(-28.711)
lnPOPLN	-0.629***	-0.671***	-0.937***	-0.627***	-0.672***	-0.939***
	(-4.652)	(-3.989)	(-25.558)	(-4.679)	(-3.990)	(-18.186)
SEC	0.009	0.003	0.003	0.010	0.004	0.007***
	(1.428)	(0.383)	(1.049)	(1.546)	(0.488)	(3.129)
INV	0.150***	0.145***	0.125***	0.151***	0.144***	0.126***
	(6.559)	(8.825)	(36.148)	(6.856)	(8.543)	(36.201)
GINI	0.914**	1.031*	2.301***	0.721*	0.892	1.686***
	(1.964)	(1.664)	(10.099)	(1.764)	(1.394)	(9.973)
XGDP /TRADE	0.010*	0.011*	0.018***	0.002	0.003	0.008***
	(1.791)	(1.696)	(5.922)	(0.658)	(0.956)	(5.631)
GINImnXGDP/GINImnTRADE	-0.004	-0.010	-0.034***	-0.007	-0.003	-0.012***
	(-0.433)	(-0.758)	(-7.711)	(-0.648)	(-0.407)	(-5.695)
CONS	2.353**	1.965**	3.462***	2.383**	1.996**	3.115***
	(2.543)	(2.013)	(8.279)	(2.523)	(2.035)	(11.069)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
Breusch Pagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.360			0.336
R^2 *(overall)*	0.31			0.30		
N	574.000	574.000	574.000	574.000	574.000	574.000

Note: As in Table 2

Table 6: Endogenous Threshold Regression Estimates: Inequality is above the Threshold

	POLS	RE	SYSGMM	POLS	RE	SYSGMM
	(1)	(2)	(3)	(1)	(2)	(3)
			GINI>45 percentile			
	-0.581***	-0.479***	-0.571***	-0.572***	-0.468***	-0.554***
lnGDPO	(-5.205)	(-3.589)	(-14.340)	(-5.140)	(-3.495)	(-12.917)
	-0.629***	-0.671***	-0.897***	-0.627***	-0.672***	-0.934***
lnPOPLN	(-4.652)	(-3.989)	(-17.454)	(-4.679)	(-3.990)	(-15.434)
	0.009	0.003	0.002	0.010	0.004	0.004
SEC	(1.428)	(0.383)	(0.766)	(1.546)	(0.488)	(1.532)
	0.150***	0.145***	0.139***	0.151***	0.144***	0.137***
INV	(6.559)	(8.825)	(20.780)	(6.856)	(8.543)	(22.608)
	-0.914**	-1.031*	-2.300***	-0.721*	-0.892	-1.806***
GINI	(-1.964)	(-1.664)	(-10.193)	(-1.818)	(-1.394)	(-9.667)
	0.010*	0.011*	0.021***	0.002	0.003	0.009***
XGDP /(TRADE	(1.791)	(1.696)	(7.344)	(0.658)	(0.956)	(7.694)
	0.004	0.010	0.038***	0.003	0.003	0.013***
GINImnXGDP/GINImnTRADE	(0.433)	(0.758)	(8.312)	(0.485)	(0.407)	(6.788)
	3.267***	2.995***	4.863***	3.104***	2.888**	4.384***
CONS	(3.118)	(2.661)	(12.161)	(3.002)	(2.548)	(12.005)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
Breusch Pagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.289			0.280
R^2 *(overall)*	0.25			0.25		
N	574	574	574.000	574	574	574

Note: As in Table 2

Table 5report the results for effect of *XGDP* in Columns 1-3 and for *TRADE* in Columns 4-6 on *GROWTH* given that *GINI* is below the threshold value (45^{th} percentile). As what envisaged, low income inequality is good for economic growth as the regression coefficient on inequality is positive and statistically significant for most specification while their interaction effects with trade openness measures is negative and statically significant for GMM estimator. The results are corroborated when we replicate the same specifications where *GINI>45*percentile in Table 6. The *GINI* coefficient now has turned from positive to negative and most are significant, while their interaction effects are positive and statically significant for GMM estimator. Implying that rising income inequality is bad for economic growth and that dampen the positive effects of trade openness on economic growth.

6. Summary and Implications

Following the recent rise in income inequality in advanced, emerging and developing economies, the key question has been on what has been the role of trade and growth on all this. That is, what are the distribution effects of trade openness and economic growth? Thus, besides reviewing the latest literature and explore the parttens and trends in data with regard to income inequality, trade and growth, this study set out to examines and asses evidence of a link between growth, trade (exports)and income inequality. While there is no particular reason to posit a clear relationship between trade (exports) and inequality, and as inequality can be considered a proxy for 'governance quality' it also test for a threshold in inequality for the effect of trade (exports) on growth. This is done using the most latest and a large panel of 100 countries that include advanced, emerging and developing economies, over 30 years (1980 to 2010), applying the standard econometric techniques that addresses most econometric problems such measurement errors, omitted variables bias, persistence in series and endogeneity and the Hansen (2000) endogenous threshold regression technique that locates the thresholds in data, tests for their significance and constructs their confidence intervals.

The reviewed empirical literature that is corroborated with the trends and patterns in the data show that, though over the past two decades most countries has been associated with unprecedented trade integration, income inequality has been rising in most countries. In emerging and developing economies, in which many countries have experienced impressive economic growth, income inequality has worsen for some countries, while it has as well stagnated or even fall in some countries. Income inequality have even worsen more in advanced economies where the top 1 percent has become more richer while the working class and the poor, the 99 percent have trade-water.

Like most of latest studies that have looked at the complex relationship between trade openness, growth and income distribution, this study finds that, though trade openness advance economic growth, on contrary income inequality reduces economic growth. Conditional on the level of income distribution, trade openness reduces economic growth at higher level of income inequality, and the opposite is true. There is as well a threshold on which income inequality, and trade openness contingent on income inequality, is good for economic growth and the opposite is also true. The key implications of these findings are that inequality is damaging to economic growth and dampen the positive effects of trade on growth; so various efforts need to be taken to redistribute incomes, to ensure sustainable and inclusive growth that is poverty reducing both in advanced and developing economies.

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APPENDIX

Appendix A1: Data Description and Sources

Table A1: List of Countries

Albania	France	Nepal
Algeria	Gabon	Netherlands
Angola	Gambia, The	Nicaragua
Argentina	Germany	Niger
Australia	Ghana	Nigeria
Austria	Guatemala	Norway
Bangladesh	Guinea	Pakistan
Belgium	Guinea-Bissau	Panama
Benin	Guyana	Papua New Guinea
Bhutan	Haiti	Paraguay
Bolivia	Honduras	Peru
Botswana	Hungary	Philippines
Brazil	India*	Poland
Bulgaria	Indonesia*	Romania
Burkina Faso	Iran, Islamic Rep.	Rwanda
Burundi	Ireland	Senegal
Cambodia	Israel	Seychelles
Cameroon	Italy	Sierra Leone
Canada	Jamaica	Slovak Republic
Cape Verde	Jordan	South Africa
Central African Republic	Kenya	Spain
Chad	Lesotho	Sri Lanka
Chile	Liberia	St. Lucia
China--Urban	Liberia	Sudan
Colombia	Liberia	Swaziland
Comoros	Liberia	Sweden
Congo, Dem. Rep.	Liberia	Switzerland
Congo, Rep.	Liberia	Tanzania
Costa Rica	Liberia	Thailand
Côte d'Ivoire	Luxembourg	Togo
Denmark	Madagascar	Trinidad and Tobago
Djibouti	Malawi	Tunisia
Dominican Republic	Malaysia	Turkey
Ecuador	Mali	Uganda
Egypt, Arab Rep.	Mauritania	United Kingdom
El Salvador	Mexico	United States
Ethiopia	Morocco	Uruguay
Fiji	Mozambique	Venezuela, RB
Finland	Namibia	Vietnam

***Source*:** Authors own's organisation

Table A.2: Variables Definition and Sources of Data

Variables	Definition	Sources
GRWTH	GDP per capita growth (annual percent)	World Development Indicators (WDI) 2013
LNGDPO	initial income measured as log of GDP per capita (constant 2005 US$) at the beginning of the period, same as lag dependent variable	WDI 2013
GINI	a measure of inequality between 0 (everyone has the same income) and 100 (richest person has all the income)	http://iresearch.worldbank.org/PovcalNet
POV	headcount poverty, measured as percent of population living in households with consumption or income per person below the poverty line as per World Bank, 2005	http://iresearch.worldbank.org/PovcalNet
POPLN	Population growth (annual percent)	WDI 2013
INFLN	Inflation, consumer prices (annual percent)	WDI 2013
SEC	School enrolment, secondary (percent gross)	WDI 2013
INV	Gross capital formation (percent of GDP)	
TRADE	Trade (export + imports, percent of GDP)	WDI 2013
XGDP	Exports of goods and services (percent of GDP)	WDI 2013

***Source*:** Authors own's organisation

Table A3: Summary Statistics for the Main Variable, 1980 -2010

	Obsn.	Mean	Std. Dev.	Min	Max
GROWTH	598	1.61	2.73	-7.03	9.47
GINI	614	41.61	11.69	0.00	74.33
POV	607	28.76	24.90	0.05	90.52
lnGDPO	609	7.20	1.60	4.83	10.30
POPLN	621	1.86	1.08	-1.91	5.89
SEC	578	55.54	32.70	3.24	133.71
INV	605	22.06	6.83	3.96	47.58
XGDP	595	31.74	18.15	6.11	101.62
TRADE	595	68.37	34.67	14.51	203.83

***Source*:** Authors own's organisation

Table A4: Correlation Matrix between all Variables

	GROWTH	*GINI*	*POV*	*lnGDPO*	*POPLN*	*SEC*	*INV*	*XGDP*	*TRADE*
GROWTH	1.000								
GINI	-0.177	1.000							
POV	-0.138	0.171	1.000						
lnGDPO	-0.038	-0.326	-0.597	1.000					
POPLN	-0.196	0.439	0.505	-0.594	1.000				
SEC	0.141	-0.397	-0.649	0.814	-0.724	1.000			
INV	0.455	-0.167	-0.347	0.055	-0.170	0.222	1.000		
XGDP	0.096	-0.065	-0.298	0.295	-0.282	0.347	0.173	1.000	
TRADE	0.095	0.011	-0.196	0.177	-0.157	0.230	0.197	0.922	1.000

***Source*:** Authors owns organisation

Table A.5: Inequality, Poverty, Growth, and Trade by Regions, 1975 -2010

Regions	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-99
East Asia & Pacific							
Gini	29.00	31.30	33.00	34.00	34.72	35.00	36.00
Poverty	77.67	59.825	54.72	43.385	31.55	16.78	12.48
Growth	6.33	6.64	9.18	8.36	7.56	7.84	9.74
Export (percent GDP)	11.79	16.30	17.96	24.70	30.36	36.86	42.60
Trade (percent GDP)	23.66	32.68	36.94	49.37	57.04	70.43	78.96
Latin America & Caribbean							
Gini	51.20	53.80	50.33	50.67	53.71	51.40	50.12
Poverty	12.87	14.465	11.32	10.52	10.79	8.22	6.47
Growth	5.13	1.68	2.50	3.24	2.59	2.50	5.53
Export (percent)	13.00	15.64	17.34	16.69	19.97	22.54	25.67
Trade (percent)	29.16	32.13	34.20	35.84	40.71	45.35	49.55
OECD Countries							
*Gini**	27.40	27.68	28.76	30.00	32.07	33.20	35.70
*Poverty**	15.92	15.23	15.30	17.07	18.41	18.88	20.77
Growth	3.38	2.23	3.76	2.21	3.04	2.43	0.97
Export (percent)	16.38	18.23	17.59	18.04	21.00	22.56	27.10
Trade (percent)	33.51	37.16	35.66	36.11	41.64	45.69	54.91
Middle East & North Africa							
Gini	..	..	41.92	39.00	39.96	39.13	35.10
Poverty	7.87	5.91	4.31	4.09	3.89	3.6	2.70
Growth	6.12	1.49	0.91	5.11	3.29	4.69	5.21
Export (percent GDP)	27.85	38.09	27.84	31.66	31.79	40.63	52.73
Trade (percent GDP)	62.38	77.21	61.95	68.76	61.71	72.42	93.02
South Asia							
Gini	..	31.27	30.56	31.60	32.35	34.22	34.66
Poverty	59.35	54.855	51.71	46.99	51.71	50.85	35.97
Growth	3.82	5.48	5.71	4.70	6.23	5.43	7.61
Export (percent GDP)	7.25	7.18	7.03	10.11	12.16	15.06	22.26
Trade (percent GDP)	16.61	18.50	17.14	21.74	26.39	31.74	50.54
Sub-Saharan Africa							
Gini	..	42.19	53.19	51.70	42.42	41.49	45.27
Poverty	53.37	50.91	56.70	57.83	57.58	55.17	47.51
Growth	2.35	1.52	1.96	0.40	3.34	4.98	5.24
Export (percent GDP)	27.76	26.48	27.35	25.95	28.64	31.69	33.11
Trade (percent GDP)	56.92	55.48	53.00	53.08	58.73	63.77	68.83

***Source*:** World Development Indicators, 2013 PovCal Poverty Database, 2012

Appendix B: More Results

Table B.1: Determinants of Cross-Country Growth, with Trade Openness Measures

	POLS	RE	SYSGMM	POLS	RE	SYSGMM
	(1)	(2)	(3)	(1)	(2)	(3)
lnGDPO	-0.542***	-0.448***	-0.655***	-0.534***	-0.391***	-1.088***
	(-4.361)	(-3.433)	(-5.465)	(-4.330)	(-2.577)	(-9.305)
lnPOPLN	-0.228***	-0.731***	-1.206***	-0.692***	-0.648***	-1.066***
	(-4.060)	(-4.412)	(-10.317)	(-5.442)	(-3.844)	(-5.660)
SEC	0.004**	0.005	0.049***	0.012**	0.003	0.046***
	(2.126)	(0.723)	(4.589)	(1.933)	(0.415)	(7.798)
INV	0.155***	0.147***	0.130***	0.156***	0.158***	0.091***
	(8.478)	(8.957)	(11.159)	(8.480)	(8.936)	(5.501)
XGDP (TRADE)	0.002	0.011*	0.009**	0.001	0.002	0.010**
	(0.871)	(1.848)	(2.206)	(0.139)	(0.457)	(2.357)
CONS	-1.212***	1.842*	3.966***	2.195**	1.403	6.049***
	(-5.294)	(1.941)	(4.782)	(2.181)	(1.267)	(6.816)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
Breusch Pagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.157			0.203
R^2 *(overall)*	0.42			0.29		0.31
N	534	534	534	528	528	528

Note: As in Table 2

Table 5: Determinants of Cross-Country Growth, with Interaction Terms

	POLS (1)	RE (2)	SYSGMM (3)	POLS (1)	RE (2)	SYSGMM (3)
lnGDPO	-0.494*** (-4.462)	-0.383*** (-2.839)	-0.643*** (-9.418)	-0.491*** (-4.017)	-0.343** (-2.240)	-0.900*** (-14.019)
lnPOPLN	-0.620*** (-4.200)	-0.657*** (-3.840)	-0.934*** (-18.577)	-0.617*** (-4.556)	-0.561*** (-3.217)	-0.804*** (-16.830)
SEC	0.009 (1.708)	0.001 (0.193)	0.010*** (3.740)	0.010 (1.708)	0.001 (0.137)	0.030*** (9.028)
INV	0.148*** (6.665)	0.143*** (8.659)	0.112*** (16.956)	0.148*** (7.961)	0.151*** (8.414)	0.106*** (13.245)
GINI	-0.043** (-2.468)	-0.056** (-2.559)	-0.112*** (-11.991)	-0.051*** (-2.611)	-0.062** (-2.510)	-0.065*** (-4.506)
XGDP (TRADE)	0.012** (2.003)	0.013** (2.019)	0.010*** (3.187)	0.003 (0.980)	0.004 (1.187)	0.006*** (4.549)
GINImnXGDP (GINImnTRADE)	0.001* (1.788)	0.001** (1.968)	0.002*** (7.566)	0.001** (2.138)	0.001* (1.904)	0.001*** (3.832)
CONS	1.900** (2.088)	1.498 (1.544)	4.099*** (9.548)	2.102** (2.081)	1.251 (1.128)	5.448*** (13.199)
Period Dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.000	0.000	0.000	0.000	0.000	0.000
Breusch Pagan(Prob>chi2)		0.000			0.000	
AR(1) /Pr> z	0.000		0.000	0.000		0.000
AR(2)			0.216			0.204
R^2 *(overall)*	0.311			0.300		
N	570	570	570	505	505	505

Note: As in Table 2