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Relationship and Causality between Technology-intensive Trade and Poverty –A Panel ARDL and Granger Causality based Analysis

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ABSTRACT

Purpose: The purpose of this study is to identify whether trade in different sectors classified based on technology intensity has differential effects on poverty in emerging economies. The study classified trade into high technology (HT), medium technology (MT), low technology (LT), and periphery products using classified trade data collected from the UNcomtrade database. The study then examined whether the relationship and causality between trade in different sectors and poverty vary.
Methodology: The study applies a panel ARDL model to identify the long-term and short-term between trade in different sectors and poverty as well as the VECM based Granger causality approach to find out the direction of causality between the variables.
Findings: The results of the study support the view that the relationships and causality between technology-intensive trade compositions and poverty differ across measures of poverty and country groups. Trade-in any sector substantially raises the average income of the poorest quintile both in low growth and high growth developing countries but they have a differential effect on extreme poverty measured by poverty HCR in different countries.
Limitations: The major limitation of the study is the unavailability of trade data. The trade data for emerging countries is not available for a long time and there are problems with missing data. Moreover, poverty and income data are not also available. Due to the unavailability of data, the study excludes some emerging countries from the analysis.
Practical Implication: The results of the study would help to identify the effects of trade on alleviating poverty and formulate trade policies that would be pro-poor. The study also opens a new window for trade-poverty linkage research.
Originality: This study is one of the unique approaches to look into the trade-poverty nexus from a different point of view. The results of the study evidence that trade in different sectors affects countries' poverty differently and thus urge research in this field in a broader scope.

1. Introduction

Over the past decades, the world has witnessed the gradual development of an integrated global economic system. International trade in recent decades has considerable growth both in terms of worth and volume. Due to this accelerating trade, the global economy has encountered noteworthy subjective changes within and between nations. Due to the coordinated world economy resulting from globalization, a large portion of the developing countries is taking part in the global market. In any case, the worry is that whether poor people have been bypassed or hurt by economic globalization and it has pulled in the focal point of the academicians and the approach producers as a pivotal research issue over the decades.

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The Heckscher-Ohlin (HO) hypothesis states that countries export goods intensively using their plentiful and low-priced factors of production, and import goods that require the countries' scarce factors whereas the specific factor model recommends that the increases from the trade of the laborers rely upon the areas (export/import) in which they work. The main structure to clarify the impact of exchange on neediness is Stolper–Samuelson (SS) hypothesis. The hypothesis states that under precise economic assumptions an increase in the relative price of a product will upsurge the real return to that factor used most intensively in the production of the good, and conversely, lead to an increase in the real return to the other factor. As the developing countries are bestowed with plentiful unskilled workers, the unskilled workers (poor people) in these nations will enjoy the most astounding gain from trade. According to Krueger (1983) and Bhagwati and Srinivasan (2002), growing trade should benefit the poor of developing countries due to their comparative advantage in producing labor-intensive products that require low-skilled or semi-skilled labor.

According to Nissanke and Thorbecke (2006) trade influences poverty through various channels, for example, economic growth, changes in factor prices and product costs, innovative change, factor allocation, etc. Among all of these channels, the trade-growth-poverty channel is the most prominent and effective one. International trade increases the income of the poor by expanding the long-run growth of the economy. The Trade-growth relationship depends on the type of products traded. Lall (2000) argued that technology-intensive products bring about faster growth in the economy compared to the growth caused by low-tech products. Aditya and Acharyya (2013) found that Export growth in the cutting edge segment exceptionally adds to the growth of output when nations have a more prominent portion of manufacturing export than the world normal. Additionally, the import of new items brings about the addition of new technology that upsurge productivity, and internal FDI causes the probability of technology move. Upward pay from productivity gains from trade should rise the benefits of the poor if there should arise an occurrence of genuinely uniform pay impacts (Harrison, 2006).

Feenstra and Hanson (1995) proposed the offshoring model which views the trade-poverty linkage from an alternate angle. This model infers that a competitive industry executes bushels of undertakings to create a solitary item, and they enlist both skilled and incompetent laborers for their works. These assignments are assembled by their expertise force. To spare cost, the industry moves a few assignments to the expertise poor nation. Thus growing trade can spur economic growth and reduce the poverty in developing countries. The above discussions clearly show that economic growth is a key channel of trade-poverty nexus and technology-intensive trade composition has differentia effects on the trade-growth relationship. This focus of the study is almost no-existent. The purpose of this study is to identify how trade composition classified by technology intensity affects poverty.

2. Literature Review

The effects of trade on poverty can be viewed from a dynamic and static point of view as proposed by Bhagwati and Srinivasan (2002). The static viewpoint argues that freer trade shrinks poverty in the developing countries due to their comparative advantage to the export of low-skilled-based labor-intensive products whereas the dynamic perspective infers that trade reduces poverty through its effects on economic growth. Krueger (1981) argued that the poor in the developing countries can gain from trade when countries have a comparative advantage in producing the labor-intensive product and the developing countries should formulate trade policy focusing on the poor.

Dollar and Kraay (2001) empirically examined the impact of four factors such as primary educational attainment at the primary level, public health, and education expenditure, the productivity of labor in agriculture comparative to that of other sectors of the economy as a whole, and formal democratic institutions, in determining the income share of the poorest. Although it is widely believed that these factors are important determinants of the betterment of a lot of poor people in some countries and under some circumstances, they did not find any corroboration that these factors increase the income share of the poorest countries in this large cross-country sample.

In another study, Dollar and Kraay (2004) focused on within-country variation and identified that changes in trade volumes have a strong affirmative effect on changes in growth and a systematic association exists between trade and household income inequality. They further showed that higher growth that accompanies greater trade volumes results in a proportional rise in the income of the poor and globalization in the developing countries has reduced absolute poverty in the past 20 years. So high volume of trade leads to faster growth and reduces poverty in the developing countries. Further, Dollar and Kraay (2002) identified the impact of trade on poverty and conducted the analysis with the countries that have more participation in international trade and covers more than half the population. They found that these countries have been experiencing faster economic growth than the rich countries from the 1970s and this expanded trade leads to increased economic growth which In turn results in the higher income of the poor. Both individual and cross-country analyses confirm the understanding that faster growth is the result of globalization leads to the reduction of poverty.

Goldberg and Pavcnik (2007) argued that although there is a great challenge to establish a clear linkage between trade liberalization and absolute poverty the correlation between trade liberalization and certain indicators of urban poverty in the short or medium term is more practical and promising. According to them, trade liberalization changes relative prices and thus probably affects poverty via the effect of price changes on consumption. They suggested that institutions in the labor market institutions, as well as their interactions with trade policy, better explain the effects of trade liberalization on inequality and poverty. In another study, Goldberg and Pavcnik (2004) identified the empirical evidence of the relationship between trade liberalization, poverty, and income inequality in the developing countries that have experienced the recent trade reforms. The results reveal that the linkage between trade liberalization and absolute poverty in the rural areas is challengeable whereas this linkage seems more promising for urban poverty in the short- or medium-run. They further said that the impact of trade openness on poverty via changes in relative price on consumption is significant.

Goldberg and Pavcnik (2007)and Harrison, McLaren, and McMillan (2011) proposes several channels of trade-poverty linkage within a country such as skill-based technological development with high skills; high growth of global production sharing; the flow of capital in the international market; firms' heterogeneity in global trade; transitional unemployment; variations in the industry pays; and impending effects on labor market standards. However, Nissanke and Thorbecke (2006) argued that although trade affects poverty through several channels, economic growth is the most crucial channel of trade-poverty linkages. However, technology development or the technology intensity of the products exported and imported significantly affects the economic growth of a country. Lall (2000) argued that countries trading technology-intensive products experience higher economic growth compared to the countries trading low-technology products. According to Aditya and Acharyya (2013), trade-in technology-intensive products has a higher contribution to output growth for the countries trading a higher share of manufacturing exports. This study classifies trade into four groups such as high technology (HT), medium technology (MT), low technology (LT), and periphery products. The study then identifies how trade in each of these sectors affects poverty measured in different forms in the emerging economies.

3. Data Description and Methodology

3.1 Data Description

It is incredibly hard to classify the product based on technology intensity particularly from national measurements because the degree of technology engaged with the creation of items and development of technology after some time can't be evaluated suitably as they occur at a reasonably disaggregated level. In addition, immensely categorized trade data dependent on technology contribution and complexity are not accessible. Albeit three-digit SITC rev. 3 provide grouped trade data detail it can't carefully separate the technology involvement of the item under the same class. This study pursues the technology-intensive based classification of products proposed by Lall (2000) and applied by UNIDO (2014)and thus classified trade into four classes dependent on technology association in the production procedure, for example, high technology (HT), medium technology (MT), low technology (LT) and periphery products.

The data set comprises 45 emerging countries covering 1994-2015. Be that as it may, data on poverty in various emerging economies are not profoundly created and not accessible for a long time arrangement. That is the reason out of 45 rising nations the poverty data are accessible for 29 nations. This study separated the country sample into two groups. Group 1 incorporates high growth emerging countries called EAGLE and group 2 incorporates medium and low growth emerging countries called NEST and other emerging countries. The most pivotal channel through which trade influences the economy is economic growth. Along these lines, isolating economies dependent on their economic growth will give a more inside and out analysis.

According to Ravallion (2003), the measure of poverty is considered an indispensable issue in the study field of trade-poverty linkages the trade-poverty relationship is very swayable to the measure of poverty. Considering the estimation issues the uses both absolute and relative measures of poverty. As the measure of extreme poverty, the study uses poverty HCR at $1.90 as defined by the World Bank. On the other hand, absolute poverty is measured as the average income of the lowest quintile (bottommost 20% population of the country) which is calculated as follows (Seven & Coskun, 2016):

Average Income of Lowest Quintile (AILQ) =

$$\frac{\text{Thes"hare of Income of Poorest 20\% population X per capita GDP}}{0.20} \quad (1)$$

The product-wise classified trade data are collected from the UNcomtrade database based on SITC rev.3. The measures of poverty are calculated based on World Bank data and other data was collected from the World Bank's world development indicators.ARDL model requires consistent data sets for a long time and a large number of missing data in the time series is not applicable for the ARDL approach. Consistent data for poverty is not available for a substantial number of emerging countries especially for countries of group 2.[1] The study excludes the countries that do not have substantial poverty data from the analysis. The country sample is provided in the appendix. The product-wise classified export and import data based on SITC rev 3 is collected from the UNCOMTRADE database, and the source of poverty and inequality data is the World Bank development indicators.

3.2 Econometric Methods

In this study, we applied ARDL (Autoregressive distributed lag) approach. Before applying any econometric models, it is compulsory to identify the order of integration of the variables using a unit root test. The panel unit root tests specify that whether the variables are stationary at their level on they are stationary at their first difference that means whether they are I (0) or I (1) because if any variables are stationary at the order higher than I (1) such as I (2), ARDL cannot be applied. Several panel unit root tests are available to identify the order of cointegration of panel data. Different unit root tests have different shortcomings that may result in loss of power. To overcome the problems and avoid loss of power of different tests the study used several panel unit root tests from the first generation and second generation. Among the first generation panel unit root test the study uses (Levin, Lin, and Chu, 2002) (therefore LLC); (Im, Pesaran, and Shin, 2003) (IPS); (Breitung, 2001) and (Hadri, 2000) test, and from the second generation test the study uses (Pesaran, 2007) tests.

To identify whether there is long-run cointegration between the variables the study applied(Pedroni, 2004)Pedronicointegration test and as which is the most popular test among all panel cointegration tests. This test has some advantages over other panel cointegration root tests such as (Johansen, 1991)panel cointegration test. Johansen cointegration requires that the variables are stationary in the same order. It means both of the variable's underestimation will be either I (0) or I (1). The Pedronicointegration test requires this assumption, and this test can be applied if the variables are in the same or different order of the integration. It means the Pedroni test can be applied whether both of the variables are I (0)/ I (1) or they are I (0) and I (1) or I (1) and I (0). Pedronicointegrationtets only identifies the presence of cointegration between the variables. But it does not provide an estimation of the relationship that is it does not provide the magnitude and direction of the relationship. For this reason, the study also applied fully modified OLS (FMOLS) as proposed by Pedroni (2000)to estimate the long-run relationship between the variables. This method provides better estimation than OLS and produces constant t-statistics and standard errors even in the presence of endogenous regressors in the estimate(Bildirici, 2014).

To determine the long-run cointegration between the variables the study applied the ARDL model to determine the direction and magnitude of the long-run and short-run relationship between the variables. There are two approaches for panel ARDL such as Mean Group (MG) Proposed by Pasaran and Smith (1995) and pooled mean group (PMG) proposed by Pesaran, Shin, and Smith (1999). MG estimator allows for both short-run and

[1] The country sample used in this study is provided in Appendix 1.

long-run heterogeneity among the groups and estimates separate regression for each country and the coefficients are unweighted means of estimated coefficients for individual countries. This model does not allow any restriction for both the short-run and long-run. On the contrary, pooled mean group (PMG) estimator assumes constant long-run coefficient across countries whereas and heterogeneous coefficients in the short run. It means that the PMG estimator allows variation of coefficients error correction term across countries in short-run restrict but long-run coefficients to the homogeneous for the cross-sections. The study applied the Hausman test to determine whether MG or PMG is appropriate for our data set.

The ARDL unrestricted Error correction model (UECM) is a variety of ARDL (p,q) as proposed by Pesaran, Shin, and Smith (2001) and the standard form of Log-linear specification of this model for the long-run relationship between the variables can be constructed as follows:

$$\Delta P_{i,t} = a_{i,t} + \sum_{j=1}^{m-1} \beta_{i,j} \Delta P_{i,t-j} + \sum_{l=0}^{n-1} y_{i,l} \Delta TC_{i,t-l} + \varphi_1 P_{i,t-1} + \varphi_2 TC_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

Where, P indicates poverty measures, TC stands for trade composition variables such as trade openness or trade composition or technology-intensive trade. Δ indicates the first difference operator and εitis the white noise term, and l is the country-specific intercept. i and t denote group and period respectively and they vary from 1 to N and 1 to T respectively.

The study selected the optimal lag length based on Akaike information criteria (AIC) or Schwarz Information criteria (SIC).The above equation has the null hypothesis of no cointegration such that :Ho:φ1= φ2=0 where the alternative hypothesis is at least one φk ≠ o (k=1,2). However, as there is no literature in determining the critical values of the above generalization of cointegration test the study applies (Pedroni, 2004) test of cointegration following several previous studies for example (Asongu, El Montasser, & Toumi, 2016; Bildirici, 2014). When the null hypothesis of no cointegration is rejected the cointegration between the variables is identified, and the long-run relationship for the ARDL model can be estimated as follows:

$$P_{i,t} = a_{i,t} + \sum_{j=1}^{m-1} \beta_{1,j} P_{i,t-j} + \sum_{l=0}^{n-1} \beta_{2j} TC_{i,t-l} + \varepsilon_{i,t} \quad (3)$$

Where the coefficient is the same for the variables as PMG approach assumes long-run homogeneous long-run relationships across countries. The optimal log of ARDL (p,q) is selected based on AIC or SIC. The short-run relationship between the variables can be constructed using Error correction term in the above equation as follows:

$$\Delta P_{i,t} - a_{i,t} + \sum_{j=1}^{m-1} \beta_{i,j} \Delta P_{i,t-j} + \sum_{l=0}^{n-1} y_{i,l} \Delta TC_{i,t-l} + \omega_i EGT_{t-1} + \varepsilon_{i,t} \quad (4)$$

Where white noise from $\varepsilon_{i,t}$ is independently and normally distributed with mean zero and constant variables. ECT is the error correction term that originated from long-run equilibrium, and ω is the coefficient that indicates the speed of restoration to equilibrium point after any shock. It is expected that ECT has a negative sign as a well significant coefficient. Based on the Hausman test the study applied a PMG estimator to estimate the parameters in the equation. It allows short-run coefficients to vary across countries whereas long-run coefficients are considered homogeneous for all groups.

Finally, to identify the direction of causality between trade composition variables and poverty inequality measures the study applied (Engle & Granger, 1987) causality. Panel ARDL approach only determines the long-run and short-run relationship between the variables, but it does not provide the direction of causality between the variables. After estimation of the long-run model the study has to apply unrestricted vector error-correction model (UVECM) based Granger causality model (Asongu et al., 2016) as follows:

$$\Delta P_{it} = a_0 + \sum_{i=1}^{m} \delta_{ik} \Delta P_{j,t-i} + \sum_{i=1}^{n} \omega_{ik} \Delta TC_{j,t-i} + \lambda_1 EC_{t-1} + \varepsilon_{1t} \quad (5)$$

$$\Delta TC_{it} = a_0 + \sum_{i=1}^{p} \phi_{ik} \Delta TC_{j,t-i} + \sum_{i=1}^{q} \varphi_{ik} \Delta P_{j,t-i} + \lambda_2 EC_{t-1} + \varepsilon_{2t} \quad (6)$$

Where εt is normally and independently distributed residual term with a mean value of zero and constant variance. Appropriate lag is selected based on Akaike information criterion (AIC) or Schwarz information criteria (SIC). ECT indicates error correction term of long-term equilibrium and coefficient of ECT (λ) refers to the speed of adjustment to the equilibrium point after any exogenous shock in the economy. The study has to estimate δ; ϕ; ω; φ; λ parameters. Based on the above equations Granger causality can be identified in three different ways following several other studies (Asongu et al., 2016; Bildirici & Kayıkçı, 2012; Boubaker & Jouini, 2014; Ozturk & Acaravci, 2011). Short-run or weak causality can be identified by testing the hypothesis Ho: ωi = 0 and Ho: φi = 0 for equations (5) and (6) respectively for causalities running from TC variables to poverty/ inequality and vice versa respectively. Long-run causalities are determined by testing the hypothesis Ho: $\lambda_1 = 0$ and Ho: $\lambda_2 = 0$ for all I and k for equation (5) and (6) for causalities directed from TC variables to poverty/inequality and vice versa respectively. Finally, to examine the strong causalities running from TC variables to poverty/inequality and vice versa the null hypothesis is Ho:ωi = λ_1 = 0 and Ho: φi = λ_2 = 0 respectively.

4. Results and Analysis

4.1 Descriptive Statistics

The summary statistics of country group 1 and group 2 provide several insights about the export and import of technology-intensive classified in the emerging economies. The statistics show that the high growth emerging countries of group 1 experienced the highest average export in primary products followed by low tech and medium-tech sectors. In the case of import, primary products have the highest share compared to other sectors. It shows that emerging countries have the highest quantity of export and import in primary products sectors. However, high values of standard deviation indicate that the quantity of average exports and imports in different sectors fluctuates significantly. There is no abnormality issue in the data sets.

For the countries of group 2 that include the medium-low growth in emerging countries, the scenario is almost similar. They have the highest share of export and import is primary products. The export and import of medium-tech sectors stand in the second-highest position for group 2. Standard deviation is also high which shows that the quantity of export and import of these sectors fluctuates substantially. Jarque-Bera test results indicate that the variables do not suffer from abnormality issues.

Table 1. Summary Statistics of Group 1

	HT_ EXPORT	HT_ IMPORT	LT_ EXPORT	LT_ IMPORT	MT_ EXPORT	MT_ IMPORT	PP_ EXP	PP_ IMPORT
Mean	5.06E+10	4.98E+10	6.21E+10	2.10E+10	5.83E+10	6.76E+10	9.70E+10	1.04E+11
Median	6.18E+09	1.85E+10	1.70E+10	1.71E+10	2.87E+10	4.87E+10	5.55E+10	4.89E+10
Maximum	6.90E+11	5.25E+11	7.58E+11	8.79E+10	5.27E+11	4.21E+11	4.66E+11	9.43E+11
Minimum	3.47E+08	1.19E+09	4.86E+09	1.66E+09	2.89E+09	6.02E+09	6.03E+09	1.06E+10
Std. Dev.	1.35E+11	1.02E+11	1.36E+11	1.98E+10	9.92E+10	8.15E+10	1.03E+11	1.67E+11
Skewness	3.621111	3.411505	3.673420	1.431842	3.314955	2.732495	1.885615	3.493880
Kurtosis	15.41496	14.10920	16.15380	4.795619	13.98339	10.92709	6.195831	15.71924
Jarque-Bera	1308.346	1076.463	1428.199	71.88189	1042.407	587.1310	154.7583	1333.849
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	7.69E+12	7.58E+12	9.38E+12	3.17E+12	8.86E+12	1.03E+13	1.47E+13	1.59E+13
Sum Sq. Dev.	2.75E+24	1.56E+24	2.79E+24	5.87E+22	1.49E+24	1.00E+24	1.60E+24	4.20E+24
Observations	152	152	151	151	152	152	152	152

Source: Authors Calculation

Note: The table reports the summary statistics of the export and import values of different sectors. The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study. Export and import values are reported in the US $. The numbers are reported in different decimal points to make the size of the tables in a standard format and appropriate for the document.

Table 2. Summary Statistics of Group 2

	HT_ EXPORT	HT_ IMPORT	LT_ EXPORT	LT_ IMPORT	MT_ EXPORT	MT_ IMPORT	PP_EXP	PP_ IMPORT
Mean	4.95E+09	6.15E+09	5.24E+09	5.04E+09	7.65E+09	1.22E+10	2.53E+10	1.47E+10
Median	3.13E+08	2.12E+09	2.70E+09	3.12E+09	2.34E+09	7.59E+09	1.22E+10	8.70E+09
Maximum	7.16E+10	5.91E+10	5.69E+10	3.76E+10	8.01E+10	7.38E+10	3.52E+11	1.15E+11
Minimum	1250.000	56309.00	2698800	0.000000	3195100	0.000000	4.16E+08	5.53E+10
Std. Dev.	1.20E+10	9.73E+09	7.37E+09	5.77E+09	1.32E+10	1.35E+10	3.94E+10	1.74E+10
Skewness	3.318577	2.832574	3.011902	2.643474	2.989416	2.209043	4.353754	2.356002
Kurtosis	14.78638	12.02118	14.59533	11.36353	13.06657	8.577646	29.26440	10.92122
Jarque-Bera	5077.436	3130.034	4737.976	2704.501	3804.036	1398.643	21246.49	2346.708
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	3.30E+12	4.07E+12	3.49E+12	3.34E+12	5.09E+12	8.12E+12	1.68E+13	9.73E+12
Sum Sq. Dev.	9.59E+22	6.26E+22	3.61E+22	2.20E+22	1.15E+23	1.21E+23	1.03E+24	2.00E+23
Observations	666	662	666	663	666	663	666	663

Source: Authors Calculation

Note: The table reports the summary statistics of the export and import values as well as RCA of different sectors. The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study. Export and import values are reported in US $. The numbers are reported in different decimal points to make the size of the tables in a standard format and appropriate for the document.

4.2 Panel Unit Root Test

The unit root test results suggest that all variables are integrated which means they are non-stationary at level but stationary at the first difference for both groups 1 and group 2. However, none of the variables has I (2) which means they are not stationary at the second difference otherwise the study could not apply the ARDL model for that variable.[2]

4.3 Panel Cointegration Test Results

The study applied (Pedroni, 2004) cointegration test as it is most popular among the panel integration tests. Pedroni test proposes seven statistics that have a null hypothesis of no cointegration. Among all these statistics Pedroni (2004) suggested panel ADF and Group ADF statistics as more reliable statistics. However, the Pedroni test does not provide direction and magnitude of this relationship between the variables. So the study also applied FMOLS cointegration estimation along with the Pedroni test. Both tests evidence the existence of long-run cointegration estimation along with the Pedroni test. Both tests evidence the existence of long-run cointegration of the variables in all cases of group 1 and group 2.[3]

4.4 Panel PMG Estimates

The long-run PMG results show that export and import of different sectors classified based on technology have a negative association with poverty HCR and positive association with an average income of lowest quintile and association is statistically significant at 1% level in both cases for group 1. It infers that in the high growth emerging countries export and import of the four sectors classified based on technology intensity significantly reduces extreme poverty measured in poverty HCR at $1.90 per day and raise average income of the lowest 20% population.

For group 2 the scenario is a little bit different. Trade does not significantly affect HCR except for low-tech export and import which raise poverty HCR significantly. However, trade-in different sectors significantly raise the income of the lowest 20% population. The results of the analysis suggest a trade in any sector substantially raises

[2] The study did not report the unit root tests results to avoid the unnecessary lengthiness of the paper. The results can be provided upon request.

[3] The results are available on request.

the income of the poorest quintile of the population both in low growth and high growth developing countries but the trade of different sectors has a differential effect on HCR in different countries. Although trade in different sectors substantially reduces extreme poverty in the high growth emerging countries such as China, India, Indonesia, Brazil, Mexico, Russia, and turkey. They do not have a significant effect on extreme poverty in low growth countries. So the benefits of trade do not reach the people using under extreme poverty of the low income developing countries whereas it benefits this segment in the high growth countries.

Table 3. PMG Long-Run Estimates

	Group 1		Group 2	
Independent Variable	HCR	AILQ	HCR	AILQ
HT_EXPORT	-26.22174* (2.669146)	2.232228* (0.570762)	-0.020503 (0.055076)	0.553297* (0.028000)
HT_IMPORT	-2.012327* (0.348271)	0.809054* (0.017851)	-0.015838 (0.075062)	0.514875* (0.005896)
MT_EXPORT	-1.795415* (0.230876)	0.743444* (0.061747)	0.016692 (0.103431)	0.799844* (0.012666)
MT_IMPORT	-1.014913* (0.173744)	0.806836* (0.026064)	0.022949 (0.126113)	0.750631* (0.008494)
LT_EXPORT	-2.983570* (0.290444)	0.947480* (0.062007)	1.284331* (0.25988)	1.523998* (0.067943)
LT_IMPORT	-1.029012* (0.143915)	0.813962* (0.011627)	1.402673* (0.08408)	0.907418* (0.009886)
PP_EXP	-2.616661* (0.250505)	0.571579* (0.038791)	0.002021 (0.112998)	0.615341* (0.011539)
PP_IMP	-2.593509* (0.362478)	0.621931* (0.027390)	0.006826 (0.122702)	0.764849* (0.019558)

Source: Authors Calculation

Note: The table reports the coefficients of the pooled mean group (PMG) estimates and their standard errors in parenthesis. *; **; and *** indicates significance level at 1%, 5%, and 10% respectively. The optimal lag order is selected based on the Akaike info criterion (AIC). The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study.

PMG short-run results indicate that ECTs have a statistically significant negative coefficient for group 1. It suggests that both HCR and AILQ can be restored to their equilibrium significantly after any shock. Although export and import of four sectors do not significantly contribute to the adjustment of imbalances for HCR except for a few cases they significantly contribute to the readjustment of imbalances for AILQ. However, in the case of group 2, both HCR and AILQ have ECTs with a negative sign and statistically significant probability value. So, HCR and can be restored to the equilibrium level significantly after any shocks. The main difference with group 1 countries is that for this group trade variables significantly contribute to the adjustment of relationship only for AILQ whereas for group 2 they have a significant effect on the adjustment of relationship at equilibrium level for both HCR and AILQ.

Table 4. PMG Short-Run Estimates Group 1

Independent Variable	Model (p, q)	Coefficient (std. error)	Model (p, q)	Coefficient (std. error)
HT_EXPORT	COINTEQ01 D (HCRAT190_ (-1) D (HT_EXPORT) C	-0.191663* (0.071003) -0.085759 (0.146303) 3.666838 (2.942236) 54.40087* (20.52872)	COINTEQ01 D (AI_LOWEST20 (-1) D (HT_EXPORT) D (HT_EXPORT(-1) D (HT_EXPORT(-2) C	-0.111212* (0.03637) 0.120800 (0.171867) 0.287930** (0.1161) -0.143425 (0.108493) -0.125736** (0.0493) -2.053100* (0.660966)
HT_IMPORT	COINTEQ01 D (HT_IMPORT) D (HT_IMPORT (-1) C	-0.24634*** (0.1490) 0.019534 (2.237282) 1.557811 (4.203581) 4.446552 (3.521364)	COINTEQ01 D (AI_LOWEST20 (-1) D (AI_LOWEST20 (-2)) D (AI_LOWEST20_(-3) D (HT_IMPORT) C	-0.483216* (0.134633) 0.072801 (0.166949) -0.016897 (0.120396) 0.23213** (0.10142) 0.088351 (0.131565) -2.486775* (0.65132)

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MT_EXPORT	COINTEQ01 D (HCRAT190 (-1) D (HCRAT190 (-2) D (HCRAT190 (-3) D (MT_EXPORT) D (MT_EXPORT (-1) D (MT_EXPORT(-2) C	-0.34927** (0.16445) -0.140662 (0.113651) 0.169656** (0.0838) -0.017995 (0.180829) 0.834387 (5.048273) -5.98855** (3.0844) 5.307096 (5.504273) 7.0485** (3.37788)	COINTEQ01 D (AI_LOWEST20_(-1) D(MT_EXPORT) C	-0.213788** (0.0864) 0.187275*** (0.1102) 0.314480* (0.101104) -1.002051** (0.40166)
MT_IMPORT	COINTEQ01 D (HCRAT190 (-1) D (HCRAT190 (-2) D (HCRAT190 (-3) D (MT_IMPORT) D (MT_IMPORT(-1) D (MT_IMPORT(-2) D (MT_IMPORT(-3) C	-0.122009 (0.129178) -0.282307* (0.07543) 0.077266 (0.094723) -0.092802 (0.160765) -2.892565 (2.136315) -1.157648 (5.525792) -0.065550 (2.955081) -1.388723 (3.821355) 0.821622 (1.652687)	COINTEQ01 D (AI_LOWEST20 (-1) D(MT_IMPORT) C	-0.476045* (0.13843) 0.122417 (0.161140) 0.211872*** (0.1262) -2.563979* (0.71778)
LT_EXPORT	COINTEQ01 D (HCRAT190 (-1) D (HCRAT190 (-2) D (HCRAT190 (-3) D (LT_EXPORT) D (LT_EXPORT(-1) D (LT_EXPORT(-2) D (LT_EXPORT(-3) C	-0.4322*** (0.2383) -0.068492 (0.187352) 0.026489 (0.057579) -0.189347 (0.204462) -4.935988 (5.410277) -14.60675 (14.23108) 3.633196 (5.624773) -11.61303 (12.44903) 14.6568*** (7.8610)	COINTEQ01 D(AI_LOWEST20 (-1) D(LT_EXPORT) C	-0.19925** (0.0859) 0.173755 (0.107079) 0.441180* (0.13307) -1.34468** (0.5653)
LT_IMPORT	COINTEQ01 D (HCRAT190 (-1) D (HCRAT190 (-2) D (HCRAT190 (-3) D (LT_IMPORT) D (LT_IMPORT (-1) D (LT_IMPORT (-2) D (LT_IMPORT (-3) C	-0.2598*** (0.1458) -0.3208** (0.1550) 0.085915 (0.053361) -0.088076 (0.189585) -4.346010 (3.488624) -6.494996 (7.112289) -5.091869 (4.882946) -3.720051 (4.510026) 2.743445 (2.266443)	COINTEQ01 D (AI_LOWEST20 (-1) D (LT_IMPORT) C	-0.563778** (0.2175) 0.120194 (0.143344) 0.156273 (0.111665) -2.856608** (1.0949)
PP_EXP	COINTEQ01 D (HCRAT190 (-1) D (PP_EXPORT) D (PP_EXPORT (-1) C	-0.3436*** (0.2006) 0.036924 (0.125194) 2.827546 (4.554319) 5.447161 (7.371115) 9.433192 (6.138515)	COINTEQ01 D(AI_LOWEST20 (-1) D(PP_EXPORT) C	-0.225611** (0.1121) 0.169842 (0.13510) 0.523878* (0.16325) -0.65007** (0.3023)
PP_IMP	COINTEQ01 D (HCRAT190 (-1) D (PP_IMPORT) C	-0.2690*** (0.1555) 0.059001 (0.135422) -5.640613 (3.781006) 8.1174*** (4.5017)	COINTEQ01 D (AI_LOWEST20 (-1) D (PP_IMPORT) D (PP_IMPORT(-1) C	-0.336813* (0.09175) 0.097264 (0.180522) 0.24034** (0.0977) 0.094681 (0.158289) -1.197691* (0.32653)

Source: Authors Calculation

Note: The table reports the coefficients of the pooled mean group (PMG) estimates and their standard errors in parenthesis. *; **; and *** indicates significance level at 1%, 5%, and 10% respectively. "D" indicates the difference operator and "(-)" means the lag number of the differenced operator. "Cointeq (-1)" indicates the error correction term (ECT). The optimal lag order is selected based on the Akaike info criterion (AIC). The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study. The numbers are reported in different decimal points to make the size of the tables in a standard format and appropriate for the document.

Table 5. PMG Short-Run Estimates Group 2

Independent Variable	Model (p, q) HCR $1.90 per day as the poverty measure	Coefficient (std. error)	Model (p, q) average income of lowest quintile (AI_LOWEST20) as poverty measure	Coefficient (std. error)
HT_EXPORT	COINTEQ01 D (HCR $1_90 (-1) D (HT_EXPORT) D (HT_EXPORT (-1) C	-0.356550* (0.122) 0.251226** (0.097) 1.178972 (0.79370) 2.225186** (0.973) 0.4087*** (0.2206)	COINTEQ01 D (HT_EXPORT) C	-0.18827** (0.0747) 0.11256*** (0.0631) -0.30306** (0.1293)
HT_IMPORT	COINTEQ01 D (HCR $1_90 (-1) D (HT_IMPORT) D (HT_IMPORT (-1) C	-0.327828* (0.121) 0.228873* (0.080) -1.392*** (0.797) 0.616363 (0.680) 0.409300 (0.277)	COINTEQ01 D (AI_LOWEST20 (-1) D (_AI_LOWEST20 (-2) D (_AI_LOWEST20 (-3) D (HT_IMPORT) D (HT_IMPORT (-1) D (HT_IMPORT (-2) C	-0.429933 (0.27276) 0.31631*** (0.1709) 0.148761 (0.170020) 0.164448** (0.0813) 0.155310 (0.159783) -0.149686 (0.118940) -0.088917 (0.12175) -0.6277*** (0.3489)
MT_EXPORT	COINTEQ01 D (HCR $1_90 (-1) D (MT_EXPORT) C	-0.33384* (0.110) 0.244782* (0.087) 0.074959 (0.6911) 0.54697*** (0.293)	COINTEQ01 D (AI_LOWEST20 (-1) D (AI_LOWEST20 (-2) D (MT_EXPORT) D (MT_EXPORT (-1) D (MT_EXPORT (-2) D (MT_EXPORT (-3) C	-0.45498** (0.2118) 0.153738 (0.130369) 0.110099 (0.107547) 0.037010 (0.163621) -0.082451 (0.142769) -0.086198 (0.091349) 0.155553** (0.0667) -2.037805** (0.9077)
MT_IMPORT	COINTEQ01 D (HCR $1_90 (-1) D (MT_IMPORT) D (MT_IMPORT (-1) C	-0.317066* (0.1057) 0.18947** (0.0903) -2.912516* (1.0665) 0.500899 (0.832440) 0.4911*** (0.2649)	COINTEQ01 D (AI_LOWEST20 (-1) D (MT_IMPORT) D (MT_IMPORT (-1) D (MT_IMPORT (-2) D (MT_IMPORT (-3) C	-0.532657* (0.18912) 0.245649* (0.07970) -0.016979 (0.153882) -0.087866 (0.064234) 0.003157 (0.056438) 0.032097 (0.044322) -2.244656* (0.7801)
LT_EXPORT	COINTEQ01 D (HCR $1_90 (-1) D (HCR $1_90 (-2) D (HCR $1_90 (-3) D (LT_EXPORT) D (LT_EXPORT (-1) D (LT_EXPORT (-2) D (LT_EXPORT (-3) C	-0.48274*** (0.290) 0.130516 (0.199642) 0.035984 (0.192241) -0.015346 (0.09874) -0.897564 (2.38004) 1.491728 (1.690492) -2.215907 (1.3851) -2.842515 (2.96721) -5.119*** (2.9593)	COINTEQ01 D (AI_LOWEST20 (-1) D (LT_EXPORT) D (LT_EXPORT (-1) C	-0.193676* (0.04723) 0.113466* (0.055875) 0.214948** (0.09442) -0.037312 (0.070077) -2.279430* (0.58443)
LT_IMPORT	COINTEQ01 D (HCR $1_90 (-1) D (HCR $_1_90 (-2) D (HCR $1_90 (-3) D (LT_IMPORT) D (LT_IMPORT (-1) D (LT_IMPORT (-2) D (LT_IMPORT (-3) C	-0.497311 (0.349668) 0.186992 (0.259297) 0.061431 (0.280019) 0.031935 (0.121361) -2.857388 (2.502579) 1.309457 (1.468090) -1.577445 (1.605034) 0.250330 (2.011544) -5.809160 (4.011867)	COINTEQ01 D (AI_LOWEST20 (-1) D (AI_LOWEST20 (-2) D (LT_IMPORT) C	-0.393905* (0.08369) 0.074753 (0.057600) -0.004473 (0.063412) 0.152310** (0.07425) -2.232187* (0.48149)

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PP_EXP	COINTEQ01 D (HCR $1_90 (-1) D (PP_EXPORT) C	-0.314365* (0.1081) 0.238449** (0.0982) -0.388437 (1.4639) 0.530796* (0.2164)	COINTEQ01 D (AI_LOWEST20 (-1) D (PP_EXPORT) D (PP_EXPORT (-1) D (PP_EXPORT (-2) D (PP_EXPORT (-3) C	-0.501688* (0.1359) 0.317389* (0.04963) 0.178632 (0.129945) -0.027370 (0.063872) 0.114962 (0.075151 0.234312** (0.0955) -1.539771* (0.3951)
PP_IMP	COINTEQ01 D (HCR $1_90 (-1) D (PP_IMPORT) C	-0.317258* (0.10976) 0.205745** (0.09813) -1.283442 (1.250265) 0.636370** (0.2583)	COINTEQ01 D (AI_LOWEST20 (-1) D (PP_IMPORT) D (PP_IMPORT (-1) C	-0.432363* (0.11355) 0.281785* (0.08399) 0.142968 (0.102031) -0.081619 (0.065649) -1.969321* (0.5053)

Source: Authors Calculation

Note: The table reports the coefficients of the pooled mean group (PMG) estimates and their standard errors in parenthesis. *; **; and *** indicates significance level at 1%, 5%, and 10% respectively. "D" indicates the difference operator and "(-)" means the lag number of the differenced operator. "Cointeq (-1)" indicates the error correction term (ECT). The optimal lag order is selected based on the Akaike info criterion (AIC). The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study. The numbers are reported in different decimal points to make the size of the tables in a standard format and appropriate for the document.

4.5 Granger Causality

Long-run causality results evidence that there exists one-way long-run causality running from trade variables to HCR and AILQ to trade for group 1. MT import and LT import have bidirectional causality with HCR whereas MT import, Lt Import, PP export, and PP import do not have any causality with AILQ for group 1. In the case of group 2, causality between trade variables and HCR is the same as of group 1, but causality runs from AILQ to trade variables in all cases except MT export that does not have any causality with AILQ.

Table 6. Long-Run Causality Results Group 1

Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics
HT_EXPORT → HCR	12.57170*	HCR→ HT_EXPORT	1.338623	HT_EXPORT →AILQ	2.724100	Ailq → Ht_Export	3.67268**
HT_Import→ HCR	11.16741*	HCR→ HT_Import	0.514819	HT_Import→AILQ	0.035517	Ailq → Ht_Import	3.74719**
MT_Export→ HCR	11.91386*	HCR→MT_Export	0.156586	MT_Export→ AILQ	0.008706	Ailq →Mt_Export	4.19204**
MT_Import→ HCR	9.863478*	HCR→MT_Import	2.830***	MT_Import→ AILQ	0.088883	Ailq →Mt_Import	1.205650
LT Export→ HCR	10.96531*	HCR→LT Export	0.650322	LT Export→AILQ	0.011004	Ailq →Lt Export	4.38004**
LT Import→ HCR	9.853409*	HCR→ LT Import	2.834***	LT Import→AILQ	0.451752	Ailq → Lt Import	1.371830
PP_Exp→ HCR	10.73254*	HCR→ PP_Exp	0.456540	PP_Exp→AILQ	1.870470	Ailq → Pp_Exp	0.170341
PP_Imp→ HCR	12.55386*	HCR→ PP_Imp	0.253164	PP_Imp→AILQ	1.153108	Ailq → Pp_Imp	1.485613

Source: Authors Calculation

Note: The Table reports the causality results of the Wald test. *; **; and *** indicates the rejection of the null hypothesis at 1%; 5%; and 10% significance level respectively. '→' indicates the direction of causality. The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study.

Table 7. Long-Run Causality Results Group 2

Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics
HT_EXPORT → HCR	14.80253*	HCR→ HT_EXPORT	0.192325	HT_EXPORT → AILQ	0.068842	AILQ → HT_EXPORT	4.740245**
HT_Import→ HCR	14.72990*	HCR→ HT_Import	1.109287	HT_Import→ AILQ	1.290642	AILQ → HT_Import	8.709679*
MT_Export→ HCR	15.72987*	HCR→ MT_Export	0.447470	MT_Export→ AILQ	0.018600	AILQ → MT_Export	2.100022
MT_Import→ HCR	13.32202*	HCR→ MT_Import	5.495**	MT_Import→ AILQ	0.718950	AILQ → MT_Import	13.27390*
LT Export→ HCR	15.85366*	HCR→ LT Export	0.176856	LT Export→ AILQ	0.162840	AILQ → LT Export	3.969207**
LT Import→ HCR	13.44607*	HCR→ LT Import	3.90016**	LT Import→ AILQ	0.710215	AILQ → LT Import	9.248839*
PP_Exp→ HCR	16.33173*	HCR→ PP_Exp	1.836662	PP_Exp→ AILQ	0.447469	AILQ → PP_Exp	5.777190**
PP_Imp→ HCR	14.97168*	HCR→ PP_Imp	2.246073	PP_Imp→ AILQ	0.198671	AILQ → PP_Imp	3.856713**

Source: Authors Calculation

Note: The Table reports the causality results of the Wald test. *; **; and *** indicates the rejection of the null hypothesis at 1%; 5%; and 10% significance level respectively. '→' indicates the direction of causality. The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study.

In the short run, the causality direction between trade variables and HCR is opposite to the long-run causality for group 1. Here causality directs from HCR to trade variables only for the case of HT export and import, MT import, and LT import whereas for AILQ one-way causality runs from AILQ to MT export, MT import, and LT import. HT export and AILQ have bi-directional causality in the short run for group 1.For group 2 there exists short-run causality running from HCR to HT import, Mt import, and LT import. Causality also runs from HT import and LT export to HCR. In the case of AILQ one-way causality runs from AILQ to trade variables except for the case of LT export and PP export.

Table 8. Short-Run Causality Results Group 1

Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics
HT_EXPORT → HCR	2.31441	HCR→ HT_EXPORT	7.066132*	HT_EXPORT → AILQ	4.27176**	AILQ → HT_EXPORT	2.7135***
HT_Import→ HCR	2.31234	HCR→ HT_Import	4.836203*	HT_Import→ AILQ	0.045901	AILQ → HT_Import	6.998510*
MT_Export→ HCR	0.312605	HCR→ MT_Export	0.901963	MT_Export→ AILQ	0.426468	AILQ → MT_Export	1.395693
MT_Import→ HCR	0.67864	HCR→ MT_Import	3.903873**	MT_Import→ AILQ	0.666270	AILQ → MT_Import	11.13473*
LT Export→ HCR	0.81701	HCR→ LT Export	0.396072	LT Export→ AILQ	2.294990	AILQ → LT Export	1.217191
LT Import→ HCR	0.55601	HCR→ LT Import	3.171232**	LT Import→ AILQ	1.327569	AILQ → LT Import	5.487866*
PP_Exp→ HCR	0.50675	HCR→ PP_Exp	0.720390	PP_Exp→ AILQ	1.111545	AILQ → PP_Exp	1.225038
PP_Imp→ HCR	0.940036	HCR→ PP_Imp	1.038760	PP_Imp→ AILQ	0.947637	AILQ → PP_Imp	1.958911

Source: Authors Calculation

Note: The Table reports the causality results of the Wald test. *; **; and *** indicates the rejection of the null hypothesis at 1%; 5%; and 10% significance level respectively. '→' indicates the direction of causality. The elaborations of the abbreviations in the table are provided in the list of abbreviations section of this study.

Table 9. Short-Run Causality Results Group 2

Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics
HT_EXPORT→ HCR	0.967314	HCR→ HT_EXPORT	1.313813	HT_EXPORT→ AILQ	0.029599	AILQ → HT_EXPORT	4.559721**
HT_Import→ HCR	2.4719***	HCR→ HT_Import	4.43068**	HT_Import→ AILQ	0.063540	AILQ → HT_Import	14.06482*
MT_Export→ HCR	1.981315	HCR→ MT_Export	1.480551	MT_Export→ AILQ	0.098557	AILQ → MT_Export	11.94077*
MT_Import→ HCR	2.046279	HCR→ MT_Import	4.7583***	MT_Import→ AILQ	0.146710	AILQ → MT_Import	23.27633*
LT Export→ HCR	3.9322**	HCR→ LT Export	0.222713	LT Export→ AILQ	0.050195	AILQ → LT Export	1.430751
LT Import→ HCR	1.230879	HCR→ LT Import	5.4399**	LT Import→ AILQ	0.030430	AILQ → LT Import	18.20570*
PP_Exp→ HCR	0.557474	HCR→ PP_Exp	2.020753	PP_Exp→ AILQ	1.294264	AILQ → PP_Exp	1.836754
PP_Imp→ HCR	1.769300	HCR→ PP_Imp	1.702708	PP_Imp→ AILQ	0.168853	AILQ → PP_Imp	5.715330*

Source: Authors Calculation

For group 1, strong causality between trade variable sand HCR is mixed directional. Bidirectional causality exists between HCR and some trade variables i.e. HT export, HT import, MT import, and LT import whereas one-way causality runs from other trade variables to HCR. AILQ has one-way causality running from AILQ to trade variables in the countries of group 1. For group 2 the strong causality is almost the same as group 1. Here, trade variables and HCR have mixed causality whereas one-way causality runs from AILQ to trade variables. Export and import of different sectors have differential causality effects on poverty measures. Trade-in different sectors cause HCR, but sometimes the opposite causality also exists. While causality runs from AILQ to trade. So the results support the hypothesis that trade in different sectors affects poverty measure differently and also the effects vary across countries.

Table 10. Strong Causality Results Group 1

Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics
HT_EXPORT→ HCR	5.387617*	HCR→ HT_EXPORT	5.422747*	HT_EXPORT→ AILQ	2.92057**	AILQ → HT_EXPORT	4.247868*
HT_Import→ HCR	5.221723*	HCR→ HT_Import	3.39914**	HT_Import→ AILQ	0.042273	AILQ → HT_Import	5.207489*
MT_Export→ HCR	4.103135*	HCR→ MT_Export	0.662253	MT_Export→ AILQ	0.317868	AILQ → MT_Export	2.695149**
MT_Import→ HCR	4.041730*	HCR MT_Import	3.594728**	MT_Import→ AILQ	0.493679	AILQ → MT_Import	7.676661*
LT Export→ HCR	4.137960*	HCR LT Export	0.496353	LT Export→ AILQ	1.762184	AILQ → LT Export	2.560675**
LT Import→ HCR	3.803113**	HCR→ LT Import	3.059775**	LT Import→ AILQ	0.982291	AILQ → LT Import	4.065551*
PP_Exp→ HCR	4.0302*	HCR→ PP_Exp	0.625631	PP_Exp→ AILQ	1.533540	AILQ → PP_Exp	0.879385
PP_Imp→ HCR	4.3723**	HCR→ PP_Imp	0.782139	PP_Imp→ AILQ	0.817255	AILQ → PP_Imp	1.662141

Source: Authors Calculation

Table 11. Strong Causality Results Group 2

Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics	Direction Of Causality	Wald Statistics
HT_EXPORT→ HCR	5.629540*	HCR→ HT_EXPORT	0.953177	HT_EXPORT→ AILQ	0.04808	AILQ → HT_EXPORT	5.028430*
HT_Import→ HCR	6.421488*	HCR→ HT_Import	3.28414**	HT_Import→ AILQ	0.49563	AILQ → HT_Import	13.00073*
MT_Export→ HCR	6.468670*	HCR→ MT_Export	1.154988	MT_Export→ AILQ	0.06891	AILQ → MT_Export	9.169885*
MT_Import→ HCR	5.801505*	HCR→ MT_Import	4.93698**	MT_Import→ AILQ	0.28936	AILQ → MT_Import	20.80030*
LT Export→ HCR	7.976312	HCR→ LT Export	0.208683	LT Export→ AILQ	0.07998	AILQ → LT Export	2.30434***
LT Import→ HCR	5.165968*	HCR→ LT Import	4.89751**	LT Import→ AILQ	0.27854	AILQ → LT Import	15.81532*
PP_Exp→ HCR	5.704384*	HCR→ PP_Exp	1.991875	PP_Exp→ AILQ	1.14524	AILQ → PP_Exp	3.156398**
PP_Imp→ HCR	6.050625*	HCR→ PP_Imp	1.898124	PP_Imp→ AILQ	0.19840	AILQ → PP_Imp	5.438947*

Source: Authors Calculation

5. Conclusion

This study identifies the effects of trade composition classified by technology-intensity effects on poverty and inequality. The study divided total export and import into four sectors like high tech (HT), medium-tech(MT), low tech(LT), and primary products (PP) based on their technology intensity. The results of the analysis suggest that the hypotheses are partially true for the emerging economies and differ across countries. Trade-in any sector substantially raises the income of the poorest quintile of the population both in low growth and high growth developing countries but the trade of different sectors has a differential effect on HCR in different countries. Although trade in different sectors substantially reduces extreme poverty in the high growth emerging countries such as China, India, Indonesia, Brazil, Mexico, Russia, and Turkey, it does not have a significant effect on the extreme poverty of low growth countries. So the benefits of trade do not reach the people using under extreme poverty of the low income developing countries whereas it benefits this segment in the high growth countries. Export and import of different sectors have differential causality effects on poverty measures. Trade-in different sectors cause HCR to reduce, but sometimes opposite causality also exists while causality runs from AILQ to trade. So the results support the hypothesis that trade in different sectors affects poverty measure differently and also the effects vary across countries. The only limitation of the study is the absence of some countries from the analysis due to the availability of substantial poverty data. The availability of the data in the future will make the analysis more robust.

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Appendix 1: Country Samples of a Aalysis

Group 1: Brazil, China, Indonesia, Mexico, Russia, and Turkey
Group 2: Argentina, Bulgaria, Chile, Colombia, Kazakhstan, Pakistan, Peru, Philippines, Poland, Romania, Slovakia, Thailand, Ukraine