10th MRIC
8-9th October, 2025
(Multidisciplinary Research International Conference)
University of Wah

Nexus of Income Inequality with Trade policy and Fiscal policy

Beenish Mahboob[1], Dr.Asma Arif [2]
[1] Department of Economics, University of Wah
[2] Department of Economics, University of Wah
[1] beenishmehboob96@gmail.com
[2]asma.arif@uow.edu.pk.com

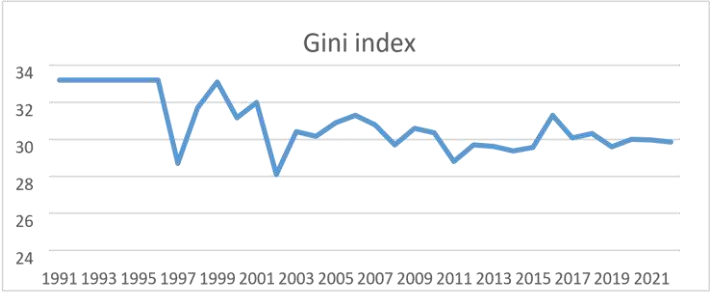
Abstract

The goal of this study is to look at the relationship between income inequality, trade policy and fiscal policy in Pakistan using annual time series data from 1991-2022.To determine the stationarity of variables ADF (Augmented dickey fuller test) is use. According to ADF all variables are stationary at level and 1st difference. On the bases of unit root test the current study use ARDL (Auto regressive distributed lag model). ARDL Bound testing approach shows the existence of long run cointegration among the variables. To determine the short run dynamics ECM is use. In current study ECM is negative and highly significant. Empirical results shows that there is a positive and significant effect of Budget Deficit on income inequality however trade openness significantly reduces inequality. By increasing the trade openness production of a country increase and employment opportunities create for Labour so in this way income inequality can be reduced. Because Pakistan is abundant in Labour intensive so Pakistan export Labour intensive commodities in this way increases cash inflows and income disparity can be reduced. Current study suggest that the government should make some policies to control income inequality there is a need to avoid persistent budget deficit in long run. The government should promote direct tax system in Pakistan because direct tax is a fiscal policy tool which can redistribute income. Increase trade openness, to pay attentions on the improvements of infrastructure, creating employment opportunities, increase domestic exports as well as increase export at global level, take decision to reform pensions and also make betterment in tax system of Pakistan.

Keywords: Income inequality, Budget deficit, Trade openness, Z, ARDL, Pakistan

Introduction

In many developing countries like Pakistan income inequality is a hurdle to development and growth. In Pakistan every third man drops lower than the poverty trap or subsistence level. When we see economic growth or economic health of a country then we see the country income. Same as when we see the economic condition of a country then we see that how much this individual have income or how much his monthly or annual income. There is a need of reduction in income inequality. For this purpose government take some measures. There is a need of some improvements in income inequality by increasing the investments and public consumptions. To calculate income disparity GINI Index used and its range is 29.6 for Pakistan. From 1958-1969 Ayub Khan administered the country. After him Zulfiqar Ali Bhutto commanded from 1971-1977. Ayub Khan focus for the betterment of the rural areas poor people. While Bhutto work for the poor in urban areas. Between 2021-2022 middle income nations are those nations whose Gross national income (GNI) Percapita of $1,046 to $4,095. GINI Index is used to calculate the level of imbalance. It catch the level of inequality and population. It changes among 0 and 1. 0 express absolute equality while 1 express absolute disparity. If values lies between 0 and 1 it means that there is a higher inequality. So in this way inequality can be measured such as income, wages and standard of living. Trend in GINI Index. Figure 1:



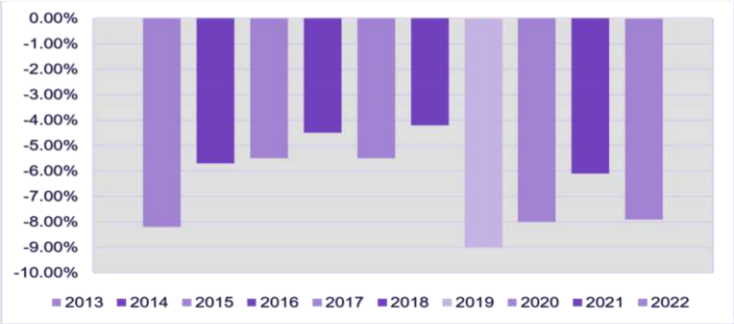
Source: world Bank

Fiscal policy means imposition of levy, national debt and public outlay for compensation and for economic growth. Fiscal measures decrease savings or an increase in income. Khan and Haq Padda (2021) investigated that income inequality can be decreased by the direct taxes. They have measured the income inequality by GINI Index. This study found that indirect taxes increase income inequality. Although indirect taxes provide major proportion of tax revenues. The expenditures on development reduced income inequality by creating the employment opportunities. Income inequality raised by budget deficit. This budget deficit can be financed by creating Money supply, through public loan and by increasing indirect taxes. This study consider that income can redistribute through direct taxes. Ahmad et al. (2021) looked examine fiscal implication by the help of duties & whole spendings on behalf of rural urban income disparity

inside Pakistan. In implementing of macroeconomic variables fiscal policy show an important role and distribute income equally among the society. Mahesh (2011) they have utilizes the impact of trade openness on income inequality. They performed their analysis by using panel data of 72 developing countries from 2000-2010. They examined that income inequality and tradeopeness are positively related to each other in developing countries it means that when open trade expand in developing countries the income gap also increases. Khoso et al. (2021) have tested the influence of trade openness on income inequality. They used the Gini coefficient to calculate the income inequality. They applied a GMM for estimation and found a negative relationship among open trade & income disparity. This study concluded from different data sources if change the calculation of disparity income it does not influence trade inequality relationship. Malla and Pathranarakul (2022) continuously increase in income inequality has become a global problem. This study investigated influence of fiscal policy on disparity of income in both advanced and emerging economies. They suggested in emerging economies not in advanced economies that income inequality can be reduced by the imposition of income tax. While they found that taxes on goods and services that is GST has no influence on income distribution. Ali and Ahmad (2013) analysed that Pakistan is counted among those countries which relies for their economic on foreign debt. So by making the economic growth in this way Pakistan is able to create employment opportunities for people. The income of an individual's increase through providing employment opportunities. They focused on impact of economic expansion on income inequality in Pakistan.

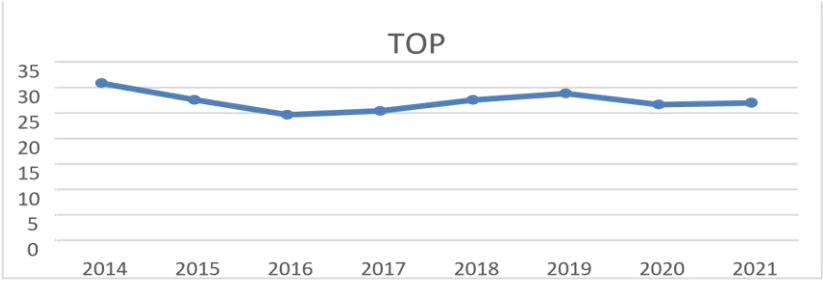
Budget Deficit of Pakistan (% of Gdp)

Below figure represents the budget deficit of Pakistan from 2013-2022. Figure 2:



From 80s many developing economies permit their countries for open trade. In this way these countries trade openly to international markets**.** Jawaid (2014) examined comparative impact of three different measures trade openness on economic growth in Pakistan. Found a +ve association among export and economic growth. There is a negative influence on economic growth through trade volume and imports. They suggested that there is a need of more Interest intended to increase exports in order to increase the

economic expansion in Pakistan. Country to make sure the more domestic production they must increase their dependence on capital goods instead of non-capital good. Saleem et al. (2020) investigated cause & effect link among FDI, GDP and (Top) in selected Asian countries. They used ARDL. They found that for Bangladesh, India and Sirilanka economic growth is significantly related to Trade openness. While in these countries the extension of trade openness is consequential for growth. Considered an association of long run cointegration within FDI, GDP and Trade openness in all countries excluding Bangladesh however in their study FDI was dependent variable. Although from last three decades trade openness increased. From 1960 to 2021 during that period the average value of Pakistan was 29.41 %. In 1972 minimum of 15.82 %. In 1993 the maximum of 38.5 %. Although the latest value from 2021 was 27.05 %. In 2021 based on 160 countries was 89.24 % as a comparison. Figure 3:



Source: world Bank

In developing countries like Pakistan positive link among trade openness and budget deficit. Pakistan imports are all the time greater than exports. Foreign exchange earnings of Pakistan are lower because Pakistan exports are minor. So there is a little addition in government revenues. On imports country pay more money so this put a burden on government spendings. However there is a negative impact on budget deficit when percapita income increase. Deficit can finance through foreign debt .After this country will pay back money with high Interest rate. In this way country is not in a condition to make investments on infrastructure, advancement of social sector and country is facing a serious issues of inflation, unemployment, slows down economic growth these all factors influencing income and causes income inequality ***Rukhsana (2013).*** The current study need to analyze the effect of trade policy and fiscal policy on income inequality in the first place. In the second place the current study needs to explain the combined effect of open trade and budget deficits on income inequality. There is work available on income inequality but the current study could not find any study with combined interaction influence of trade openness & budget deficit on income disparity. So this research plans to fills this gap by considering the combined interaction effect. Basic objectives of the study are to explore the influencing factors of Income inequality. To analyze the behavior of the combined effect of open trade and budget deficit on Income inequality. Most important significance of current research is we would be in a position to understand the

problem of income inequality by explaining the combine interaction effect of budget deficit and trade openness. The current study helpful for the policy makers to suggested the policies for the reduction in income inequality through controlling the budget deficit and by making improvements in trade openness.

Materials and Methods

The income inequality (GINI) is used as the dependent variable in this study. However trade openness, budget deficit, inflation, Unemployment, economic growth are used as independent variables. This study used ARDL (auto regressive distributed lag model to estimate long run short run relationships. Present research used interaction term to determine that how income inequality is influence through combine interaction of trade openness and budget deficit. Data is collected from World Bank data base for development indicator (WDI), and International monetary fund (IMF).

Econometric Model

Following previous studies on data accessibility and economic theory we the following model.

$$GINI = \beta_{\circ} + \beta_1 BD + \beta_2 TOP + \beta_3 Z + \beta_4 UNE + \beta_5 \mathrm{KF} + \beta_6 INF + \beta_7 GDP + \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

In Eq (1) GINI is dependent variable which indicates the income inequality, BD, TOP, Z, UNE, INF, GDP,KF are independent variables such as BD represents Budget deficit, TOP indicates trade openness, Z represents interaction term the combine effect of TOP & BD,KF capital formation UNE indicates the Unemployment, INF indicates inflation GDP shows economic growth and μ represent error term. β_1, β_2, β_3, β_4, β_5, β_6, β_7 *are elasticities* Of GINI Index such as BD Budget deficit, TOP Trade openness, Z interaction term, KF Capital formation, UNE unemployment, INF inflation, GDP economic growth.

ARDL Model

$$\Delta GINI_t = \beta_{\circ} + \sum_{i=1}^{p} \beta_{1i} \Delta GINI_{t-i} \sum_{i=0}^{q1} \beta_{2i} \Delta BD_{t-i} + \sum_{i=0}^{q2} \beta_{3i} \Delta TOP_{t-i} + \sum_{i=0}^{q3} \beta_{4i} \Delta z_{t-i} + \sum_{i=0}^{q4} \beta_{5i} \Delta INF_{t-i} + \sum_{i=0}^{q5} \beta_{6i} \Delta UNE_{t-i} + \sum_{i=0}^{q6} \beta_{7i} \Delta KF_{t-i} + \sum_{i=0}^{q7} \beta_{8i} \Delta GDP_{t-i} + \beta_9 GINI_{t-1} + \beta_{10} BD_{t-1} + \beta_{11} TOP_{t-1} + \beta_{12} Z_{t-1} + \beta_{13} INF_{t-1} + \beta_{14} KF_{t-1} + \beta_{15} UNE_{t-1} + \beta_{16} GDP_{t-1} + \lambda ECT_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots (2)$$

In equation (2) GINI is the coefficient to measure income inequality, TOP indicate trade openness, BD shows budget deficit, Z represents the interaction term (combine effect of BD & TOP), UNE indicates unemployment, INF shows inflation and GDP represents the economic growth of a country. μ Is disturbance term that is assumed to be normally β_8, β_9, β_{10}, β_{11}, β_{12}, β_{13}, β_{14}, β_{15}, β_{16} are showing the long run relationships among variables such as (TOP) Trade openness, (BD) budget deficit, (Z) combine effect of TOP& BD, (UNE) Unemployment, (INF) inflation, and

(GDP) economic growthβ_{1i}, β_{2i}, β_{3i}, β_{4i},$_{5i}$,β_{6i},β_{7i}, β_{8i} are showing the short run. λ Showing the speed of adjustment. P show the lag of dependent variable while lag of Regressors are representing by q. To examine the stationarity of time series variables, current study used unit root test. For a time series to be Stationarity it must meet three conditions. Constant mean over time, Constant variance over time ,Auto covariance should not depends on time Its means series are stationary . To check the Long run association midst the variable the current study used Bound test. ARDL Bound test is a method that was established by Pesaran in (2001). The ARDL bound test predict that all the variables are I (0), or I (1). By using the unit root test firstly we examine the order of integration of all variables.in bound test F-Statistic value should be greater than from lower and upper bound critical values. The value of F-Statistic will be compare from lower and upper bound critical values are appropriated from pesran et al (2001).Cointegration bound test shows there is a presence of long run association between the variables in current studies. Now we can write the long run model as given below.

$$GINI = \beta 1BDt-y + \beta 2TOPt-y + \beta 3Zt-y + \beta 4UNEt-y + \beta 5\mathrm{KF}t-y + \beta 6INFt-y + \beta 7GDPt-y + \mu \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

To test the structural changes in an ARDL model we can examine the CUSUM and CUSUM Squares graphs to determine if they fall within the critical bounds. If the graphs demonstrate model stability and long run estimates then the model is considered satisfactory. However if the stability of the ARDL model is not met and the CUSUM and CUSUMSQ values fall outside the critical bounds then a Chow test may be conducted to confirm structural breaks. In this case the Gregory - Hansen approach can be used to diagnose the structural break and determine remedial measures for any shocks in the time series data. The cumulative sum detects systematic changes in regression coefficients while the cumulative sum of squares test detects sudden changes in the constancy of the regression coefficients. Brown et al. recommend using the long run stability test to check the stability of the model. An error correction model is a type of multiple time series model that is frequently utilized for data in which the underlying variables exhibit a shared stochastic trend over the long term which is also referred to as cointegration. Theoretical principles guide the error correction model which is a beneficial method for determining the immediate and long term impacts of a single time series on another. The term “error correction” in the error correction model pertains to the adjustment process of dependent variable to its long term equilibrium after experiencing a deviation from it in the previous period.

Results and Discussion

Descriptive Statistics provide concise numerical representations of a dataset, which may either represent the entire population or a selected sample. These statistics are categorized in to measures of central tendency, such as mean, median, and mode and measure of variability including standard deviation, variance, minimum and maximum variables kurtosis and skewness. By using descriptive statistics we can effectively summarize the data and provide a clearer understanding of its meaning allowing for easier interpretation. The below table shows the mean, median, maximum, minimum, standard deviation, of the Variables Gini (coefficient of measuring income inequality), TOP is trade openness, BD is budget deficit, INF is inflation, UNE Unemployment , KF capital formation ,GDP per capita and Z (interaction term) here Z represent combined interaction effect of trade openness and budget deficit. The mean of GINI is 1.874.The median of GINI is 1.515. The maximum of GINI is 3.481. The minimum of GINI is 1.457. The S.D of GINI is 0.647.The mean of Budget Deficit (BD) is -0.727. The Median of BD is -0.359. The maximum of BD is -0.196.the Minimum of BD is -2.620. The S.D of BD is 0.684.the mean of inflation is 10.241.the median of inflation is 8.855.the maximum of inflation is 38.511. The minimum of inflation is 3.258. The S.D of inflation is 6.683. The mean of tradeopeness (TOP) is 1.594. The median of trade openness (TOP) is 1.392. The maximum of trade openness is 2.738. The minimum of trade openness is 1.397. The s.d of tradeopeness is 0.319.the mean of unemployment is 9.013. The median of unemployment is 5.105. The maximum of unemployment is 85.930. The minimum of unemployment is 0.400. The s.d of unemployment is 16.460. The mean of GDP is 2.885. The median of unemployment is 2.905. The maximum of GDP is 3.209. The minimum of GDP is 2.582. The s.d of GDP IS 0.220. The mean of Z is -1.125. The median of Z is -0.556. The maximum of Z is -0.291.The minimum of Z is -3.835. The S.D of Z is 1.005.

Table 2: Descriptive Statistics of the Variables

	GINI	BD	TOP	Z	KF	INF	UNE	GDP
Mean	1.874	-0.727	1.594	-1.125	12.125	10.241	9.013	2.885
Median	1.515	-0.359	1.487	-0.556	12.182	8.855	5.105	2.905
Maximum	3.481	-0.196	2.738	-0.291	12.953	38.511	85.930	3.209
Minimum	1.457	-2.620	1.392	-3.835	11.248	3.258	0.400	2.582
S.d	0.647	0.684	0.319	1.005	0.510	6.683	16.460	0.220

Results of Unit Root Test

The unit root test is a method used to determine if trending data should be either first differenced or regressed on deterministic functions of time to achieve stationarity. To determine the order of

integration of the variables we conducted a stationarity test using the ADF test recommended by Dickey and Fuller (1979) and the results are presented in table 4.2. The stationarity test indicates that there are no second order integrated variables suggesting that order of integration of the variables used is either at the level of I (0) or after the first difference I (1).

Table 3 : Unit Root Results (ADF Unit Root Test)

Variables	Level	First difference
GINI	0.0021***	-
BD	-	0.0002***
TOP	-	0.0001***
UNE	-	0.0000 ***
GDP	-	0.0003 ***
INF	0.0000***	-
KF	0.0658**	-

The above table shows the results of unit root test in which we apply Augmented Dickey Fuller test (ADF) to check stationarity of data. Based on the augmented Dickey fuller test the variables GINI, &Inflation (INF) are stationary at level and 1% level significance. And KF (capital formation is significant at 5% level of significance. While rest of variables BD (budget deficit) TOP (trade openness), UNE (Unemployment) and GDP are stationary at first difference and level of significance is 1%.

Bound Testing Results

Bound testing is an expanded version of ARDL modelling that employs F and T- statistics to determine the significance of the lagged level of variables in a univariate equilibrium correction system. This is done when it is unclear the data generating process underlying a time series is trending or first difference stationarity. The critical value is based on the Narayan 2005 table of critical values for bound test. If the F-Statistics value exceed from upper bound I(1) it indicates cointegration while if it falls below the lower bound I(0) there is no cointegration however if the value falls within I(0) and I(1) the results are inconclusive and depend on whether the variables are I(0) or I(1). The ARDL bounds testing approach is a cointegration technique developed by Pesaran et al. (2001) to determine the presence of a long term relationship between variables. Table 4.3 shows that the estimated F-Statistics value (4.36) exceeds the upper bound value which means that the null hypothesis of no long run relationship is rejected. Therefore we conclude that the

variables have a long term association .if F-Statistics value is lower than the lower bounds it means that there is no cointegration. When the F-Statistics values lies between lower bound critical values the results are inconclusive. It is worth noting that lag length used in the model can affect the long run relationship results **(Bahmani Oskooee and Bahol 2000)**

Table 4: Bound Test

Statistics	Value
F-Statistic	4.36

Table 5 : Critical Bounds Value

Significance	Lower bound	Upper bound
At 10%	2.03	3.13
.At 5%	2.32	3.5
At 2.5%	2.6	3.84
At 1%	2.96	4.26

Long Run Coefficient of ARDL Model

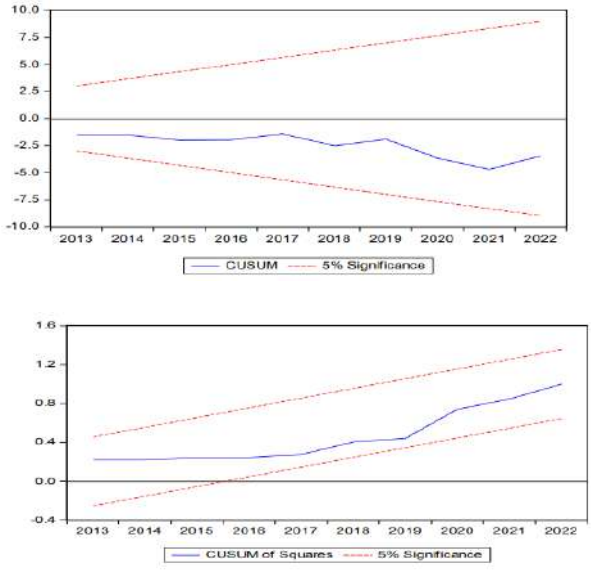
Table representing the long run results of ARDL model. Specify the long run results of ARDL model findings proved that there is a significant and Positive relationship among BD and income inequality. As 1% increase in GDP there will be Increase of 12 units in income inequality. There is a negative and significant relationship among trade openness and income inequality. As 1% increase in trade openness there will be a reduction of 2.91 units in income inequality. A positive and significant relationship among Z (Interactive term) and income inequality at 5% level of significant. It employes that if 1% increase in Z there will be increase of 8 units in dependent variable such as GINI. There is a negative and significant relationship among GDP and income inequality. As 1% increase in GDP there will be reduction of 20 in income inequality. There is a positive and significant influence of unemployment on GINI. As 1% increase in unemployment there will increase of GINI by 0.05 units. There is a positive and insignificant relationship among Inflation and GINI. A negative and significant relationship among Capital Formation and income inequality. As 1% increase in capital formation reduced income inequality by 9 units. The findings of current study are consistent with the previous studies i.e. Haq Padda I.U (2021), Stolper Smelson (1941), K Rukhsana (2013), Arshad Muhammad (2005), Demalo.et al (2006) ,Khadija Khartik (2022).

Table 6 : Long – Run Result of ARDL

Variables	Coefficient	S.D	P-Value
BD	12.607	4.980	0.0298 **
TOP	-2.918	1.326	0.0525**
Z	8.183	3.360	0.0352**
INF	0.006	0.033	0.8525
UNE	0.051	0.023	0.0551**
GDP	-20.026	6.539	0.0120***
KF	-9.809	4.811	0.0688**

Stability Test (CUSUM and CUSUMQ)

The cumulative sum of (CUSUM) as well as the Cumulative sum of square techniques are enforced to check the stability of the estimated ARDL model. Brown et al recommended the Stability test CUSUM and CUSUMSQ .We hypothesize that model is fundamentally stable since both plots should be within the critical bounds at 5% level of significance. From Figure 1, we infer that the CUSUM & CUSUMSQ is exists among the critical bounds implying the estimated ARDL model is Reliable & Stable.



Estimation of Error correction Model (ECM)

After determining the existence of long term relationship among the variables the next step is to analyze the short term dynamics of the model. This is done by using the error correction model. Which measure the extent to which past imbalances can be corrected in the current time period. The ECM provides insight in to short term behavior of the model and how quickly the variables adjust towards their long term equilibrium after experiencing a deviation from it in the previous period. The Table 4.5 shows the results of the specified ARDL model error correction representation the short run elasticies. It is represented by the coefficients of the variables with the sign. The dependent variable regressed with lags in the ARDL model.

Table7 : Results of Error Correction Model

Variables	Coefficients	S.D	Probability
D(BD)	12.607	4.980	0.0298**
D(BD(-1))	20.810	11.189	0.0925*
D(TOP)	-2.918	1.326	0.0525**
D(TOP(-1))	-4.161	2.689	0.1529
D(Z)	8.183	3.360	0.0352**
D(Z(-1))	14.041	7.612	0.0949*
D(GDP)	-20.026	6.539	0.0120***
D(KF)	15.603	6.414	0.0353**
D(INF)	0.006	0.033	0.8525
D(UNE)	0.024	0.013	0.1041
D(UNE(-1))	0.051	0.023	0.0551**
ECM	-1.02	0.239	0.0016***

In the Short run the probability value of BD is small indicating that BD influences the dependent variable i.e. income inequality by positively. The lag value of BD represent that in the previous year BD also influence the income inequality but in previous year Budget deficit also effected income inequality positively. Trade openness is another control variable that effect negatively to income inequality. It means that 1% increase in TOP reduces GINI by 2 units. In short run GDP is negatively and significant influence on income inequality. As 1% increase in GDP reduced GINI by 20 units. Z (combine effect of TOP, BD) is a significant and positively influence on income inequality. As 1% increase in Z there will be increase in GINI by 8 units. In short run there is a positive and insignificant influence of inflation on GINI. There is a positive and significant

influence of unemployment on GINI. As 1% increase in unemployment increase GINI by 0.02 units. The coefficient of ECM is negative -1.02 and it is highly significant (0.0016) at 1% level of significance. Which shows that there is existence of long run relationship among the variables. It reveals that in current year 1.02% disequilibrium is corrected within a year. In ECM the negative sign of coefficient shows that convergence in short run model.

Conclusion

The primary objective of this research is to investigate and to review the Nexus of income inequality with trade policy and fiscal policy. This research have done through ARDL Bound testing approach and through ECM. Current study use time series data from 1991-2022. Unit root test confirm that all variables are significant at level and 1st difference and no any variable is significant at 2nd difference. ARDL results Shows that R-Square is (0.78 %) which means that 78% variations comes in dependent variable GINI Coefficient due to independent variables. The probability values of these variables are significant which shows that these variables have a strong influence on GINI Coefficient. Although the probability value of inflation is insignificant. Value of Durbin Watson is 1.83 which shows that there is no nonappearance of serial autocorrelation. Bound test represents that the F-Statistics values is greater than from critical values of upper bounds and lower bounds which shows that there is a presence of long run relationship among variables. Value of ECM is (-1.02) i.e. 102% and it is also statistically significant (0.0016) at 1%. According to this study minimizing income inequality requires lowering ongoing budget deficit through fair fiscal measures like encouraging direct taxation and cutting back on waste spending. Because it creates jobs and lessens inequality. Trade openness should be promoted especially in Labor Intensive Industries. In addition to investments in capital formation and skill development coordinated fiscal trade strategies can guarantee inclusive growth distribution of income in Pakistan.

Limitations and Future Work:

Although the current study shows the relationship between Income Inequality, Fiscal policy and Trade policy in Pakistan by using ARDL approach. However we did not collect the provincial data of income inequality in Pakistan. Additionally researchers can use more advance Econometric Technologies to check the difficult relationship among fiscal policy, Trade policy and income inequality.

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