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Research Article

Inequality Growth Trade-Off And Poverty Reduction In Pakistan

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ABSTRACT

This study examines the relationships between economic growth, income distribution, and poverty in Pakistan for the period 2007-08 to 2018-19. Firstly, the study estimates the sensitivity of poverty to growth and inequality at both the national and sub-regional levels. Secondly, it investigates how much growth is required to offset the negative impact of an increase in inequality on poverty in Pakistan. This trade-off between inequality and growth is computed by using a tool called the "inequality–growth trade-off index" (IGTI), employing the decomposition method proposed by Kakwani (1993). The study uses the data from the "Household Income And Expenditure Survey" (HIES) conducted by the Federal Bureau of Statistics in Pakistan.

The findings indicate that ultra-poor individuals are more sensitive to changes in inequality than to changes in growth. This suggests that a greater increase in average growth is needed to offset the effects of increased inequality among the ultra-poor. Furthermore, the results suggest that poverty would decrease more significantly with a rise in average growth among the rural population compared to the urban population.

In conclusion, to effectively reduce the poverty gap and the severity of poverty, policies aimed at reducing inequality would be more beneficial than those focused solely on promoting growth at the national, regional, and provincial levels in Pakistan.JEL**:** C14, C23, C46, I3, O52

Keywords: Poverty, growth, growth elasticity of poverty, inequality

Introduction:

Poverty can be reduced either by reducing inequality, increasing growth, or a combination of both. Growth, poverty, and inequality are intricately intertwined. The impact of growth on poverty varies greatly; a 1% rise in per capita income can reduce income poverty by up to 4% or even less than 1%, depending on the context, such as the country and the time period considered (Ravallion, 2004). This variability may be partly attributed to initial conditions, or the level of income and asset inequality, and more importantly, to the elasticity of poverty levels to changes in growth and inequality. Income inequality has an impact on how quickly growth reduces poverty (Ravallion, 2004). According to Ali and Thorbecke (2000), a rise in growth is more effective in reducing poverty in rural regions compared to the effect of income distribution in urban areas. High-inequality economies may require three times as much growth as low-inequality nations to combat poverty (Hanmer and Naschold, 2000). Furthermore, since economies are often vulnerable to various shocks that hinder growth, increased inequality exposes a larger portion of the population to poverty. Development economists have emphasized that the unfair distribution of income is a significant barrier to effective poverty reduction (Ravallion, 2001). It is widely acknowledged that inequality has a direct impact on the efficiency of growth in alleviating poverty (McKay and Perge, 2011). Hanmer and Naschold (2000) have asserted that improvements in income distribution may be more significant than the increase in growth for alleviating poverty in some nations with high inequality, specifically those with low growth rates. This may be due to the fact that as average income rises, the impact of growth on reducing poverty increases (Heltberg, 2001). In other words, growth is less impactful in countries with high inequality at reducing poverty (Hanmer and Naschold, 2000). Due to its direct and indirect impact on poverty, as

well as its connection to economic growth, a decrease in inequality plays a significant role in reducing poverty (Naschold, 2002).

During periods of rapid economic growth, substantial inequalities persisted in Pakistan, hindering not only the rate of growth but also its ability to reduce poverty. Moreover, sustained economic growth has never been consistent in Pakistan, with rates ranging from 5% in 2007-2008 to 3.7% in 2010-2011 and 3.6% in 2012-2013, lower than those of other South Asian countries (GOP, 2012–13). On the other hand, the wealth gap has widened over decades, and there is a noticeable disparity in the level of well-being across different sectors of society. Income inequality in Pakistan increased in both rural and urban regions, with rural regions experiencing a greater increase. Specifically, the income gap increased by 6%, 2%, and 8.7% at the national, urban, and rural levels respectively from 1987-88 to 2013-14 (Jamal, 2015). The income of the upper quintile increased by 31.7%, while the income of the poorest 20% increased by only 4.1% between 1987-88 and 2013-14. Studies have shown that the gap in income between provinces has grown significantly in the past 15 years in Pakistan (Pasha, 2015). The Gini coefficient was highest in 1987-88 in urban Punjab, where income distribution is most unequal, and remained so, with a 5 percentage point increase in 2013-14 (UNDP, 2016). Income inequality in rural Punjab increased by 29% between 1987-88 and 2013-14, while it worsened by nearly 36% in rural Sindh, and overall inequality in Sindh increased. Income inequality increased by 28% and 26% in Baluchistan and KPK urban areas, respectively.

This study estimates the sensitivity of changes in poverty levels to changes in growth and inequality in Pakistan; further, it assesses how much growth rate is required to offset the negative impact of the rise in inequality on poverty levels in Pakistan at national, regional, and provincial levels from 2007-08 to 2018-19.

Literature Review:

A variety of empirical studies, both national and international, have looked at the links between economic growth, inequality and poverty.

The link between growth and inequality has long been an issue of debate. Nowadays, there is a widespread belief that inequality is a significant factor in influencing the rate and structure of growth, rather than being merely a by-product of growth. Scholars argue that inequality influences both the rate and pattern of development. However, the literature has generated contradictory findings regarding the impact of household consumption inequality on growth, with some evidence suggesting a direct relationship, while others indicate an indirect one (Barro, 2000). The elasticity of income poverty changes systematically as inequality rises (Hanmer and Naschold, 2000). The income elasticity of poverty decreases at higher levels of inequality. This is logical because less current and additional income going to the poor dimssinishes the impact of growth on reducing poverty. Additionally, the conditions and types of growth matter more than income levels in terms of how economic growth alters the income distribution (Fields, 2003).

Kraay (2004) utilized a sample of developing nations from the 1980s and 1990s to conduct a poverty variance decomposition, demonstrating the significance of economic growth in combating poverty. His research revealed that average income growth was responsible for the decline in poverty indices, underscoring the importance of policies supporting economic growth for the welfare of the poor. Countries with growth-friendly policies aimed at reducing inequality exhibited significantly higher growth-poverty elasticity (Ravallion, 2001). Son (2004) demonstrated that economic growth contributed to poverty reduction in 95% of the 84 countries in his study between 1996 and 2000. Hoffmann (2005) found that in Brazil, a 1% increase in per capita household income led to a 0.84% decrease in the percentage of the population classified as poor. Adams (2002) conducted a cross-country analysis of several emerging nations and found that rapid and consistent economic growth is the most efficient means of poverty alleviation. He found that a 10% increase in a nation's average income resulted in a 20–30% reduction in poverty.

The significant reduction in poverty in China since 1979, with nearly 450 million people lifted above the poverty line, is attributed to the country's rapid economic growth (Lin, 2003). Poverty has also declined significantly in India since the 1980s, with the rate of decrease accelerating in the 1990s. India's remarkable growth performance during this period has played a significant role in this decline (Hbhanumurthy and Hmitra, 2004).

Conversely, the findings of a study on economic growth and poverty in Nigeria conducted by Stephen and Simeon (2013) take an opposite stance and reveal a positive and substantial association between the two, suggesting that economic progress does not alleviate poverty. According to Ravallion (2006), it is crucial to consider initial income inequality levels in this context, as they affect the extent to which poverty can be reduced by economic growth. Research indicates that a 1% increase in income/consumption can lead to a 4.3% decrease in poverty in countries with low levels of inequality, but only a 0.6% decrease in poverty in countries with high levels of inequality.

A substantial body of empirical evidence supports the notion that inequality impedes economic growth. Using large panel datasets spanning 173 countries from 1960 to 2010, Berg and Ostry (2011) discovered that overall inequality slows growth, at least in the medium term. Higher income shares for households in the middle and lower quartiles may promote future growth, resulting in additional income increases for the poor and middle classes, in addition to short-term assistance to the poor (Dablo-Norris et al., 2015).

Ravallion (2005) discovered a non-linear relationship between growth-poverty elasticity and the initial level of inequality in a group of poorer countries. He maintained that until inequality is reduced, economic growth would

have little influence on reducing poverty. Therefore, the change in income distribution is a major factor influencing rates of poverty reduction for a given growth rate.
According to empirical data, distribution has a greater impact on reducing poverty in urban areas than growth does in rural ones (Ali and Thorbecke, 2000). To shift economic growth toward poverty reduction, a thorough analysis of the trajectory of economic growth is necessary. Accordingly, the elasticity of poverty with respect to growth and inequality is significantly influenced by the quality and pattern of economic growth, as well as the implementation of socialist policies (pro-poor and pro-growth) (Kakwani, 2010). To strengthen the effect of growth on poverty reduction, distribution can be pursued as a second policy goal. Equity is likely to rise while market efficiency increases if various anti-poor institutional constraints and policy-induced predispositions are addressed (World Development Report, 2000-01).
Depending on the method used to calculate poverty, the relative effects of growth and distribution may vary. While growth factors often dominate changes in absolute poverty, distribution effects are far more significant when examining relative poverty measures (Ali and Thorbecke, 2000). Moreover, inflation-adjusted poverty lines underestimate the growth effect, whereas constant poverty lines overstate it. As a result, using different methods and measures can significantly influence policy outcomes, highlighting the need for meticulous consideration of precise poverty measures

3. Methodology

3.1. Data & Software Used:
The research study utilized data from the Household Income and Expenditure Survey (HIES) conducted during the periods of 2007-2008, 2010-11, 2011-12, 2013-14, 2015-16, and 2018-19. This survey, administered by the Federal Bureau of Statistics (FBS) in Pakistan, is designed to ensure representation at both national and provincial levels, covering both rural and urban areas comprehensively.

3.2. Methodology for the Estimation of Poverty Levels:
The methodology employed to estimate poverty levels encompasses three fundamental steps: defining an appropriate welfare indicator, establishing a poverty threshold, and selecting an appropriate poverty index.

3.2.1. Well Being Indicator:
When assessing poverty within the context of monetary resources, two primary methodologies are commonly employed: utilizing either income or consumption as indicators to gauge household well-being. In many developing countries, accurately measuring income presents challenges due to a substantial portion stemming from self-employment within informal sectors. Conversely, expenditure tends to be more readily quantifiable. In Pakistan, aggregate household consumption expenditure serves as a proxy for assessing living standards. However, before incorporating aggregate household consumption expenditure into poverty estimations, three crucial adjustments are necessary.
Firstly, choosing items for consumption aggregates entails adding up the costs of frequently consumed items. Secondly, the basic adult equivalence scale is used in this study to estimate poverty, with individuals under the age of 18 assigned a weight of 0.8 and those aged 18 and up assigned a weight of 1. The third step involves adjusting for spatial and temporal variations in the cost of living when computing aggregate consumption expenditure from survey data. This study utilizes the Paache price index at the primary sampling unit (PSU) level to mitigate price disparities across different regions over the year.
The welfare indicator utilized in this study is the 'spatially adjusted monthly aggregate per-adult equivalent consumption expenditure.'

3.2.2 Poverty Line:
From 1990–1991 to 2011–12, the Food Energy Intake (FEI) approach was used to calculate the poverty line in Pakistan because the definition of poverty was linked to inadequate dietary intake. Pakistan's Planning Commission adopted the Cost of Basic Need (CBN) approach to calculating the poverty line in 2013–14 and onwards. Because it concentrates on moderate poverty and bases its assessment of poverty status on the minimal income necessary to remain above the poverty line, the CBN method is thought to be more effective.

3.2.3. The FGT Class of Poverty Indices:
Several measures for poverty exist; however, this study specifically examines three indices, to assess poverty levels in Pakistan: headcount ratio (P_0), poverty gap index (P_1), and squared poverty gap index (P_2). These indices belong to the category of additive poverty indices. The Foster, Greer, and Thorbecke (FGT) class of poverty indices serves as a generally recognized generalization of these measures and is expressed by the following formula:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{Gap_i}{z}\right)^{\propto}, (\alpha \geq 0)$$

The headcount ratio serves as a practical tool for guiding policies targeting individuals closest to the poverty line. Conversely, the poverty gap index and squared poverty gap prioritize assistance for those experiencing greater impoverishment further below the poverty threshold.

3.3. Methodology for the Estimation of Inequality:

This study evaluates consumption inequality in Pakistan by estimating the Gini index. The Gini index, a commonly used metric for assessing inequality through the Lorenz curve approach, can also be calculated using the following formula:

$$G = \frac{n+1}{n-1} - \frac{2}{n(n-1)\mu}\sum_{i=1}^{n}\gamma_i\, y_i$$

3.4. Measuring Growth:

The measurement of economic growth entails calculating the spatially adjusted mean household consumption expenditure, obtained from household surveys (HIES)

3.5. Decomposition Method Developed by Kakwani (1993)

Decomposition method developed by Kakwani (1993) is employed to estimate the Inequality Growth Trade-off Index. Following are the steps entailed in this analysis.

Assuming θ serves as a poverty indicator derived from three variables: (1) the poverty line denoted as z (2) the average per capita income/consumption represented by μ and (3) the income/consumption inequality signified by $l(p)$. The formulation of the poverty indicator θ is presented below:

$$\theta = P[z, \mu, l(\rho)]$$

The Lorenz curve, a widely used indicator of inequality, is sensitive to distribution shifts defined by the parameters $m_1, m_2 \ldots m_j$. Changes in these parameters directly affect the shape of Lorenz curve. Assuming a constant poverty line$'z'$, poverty can be decomposed as:.

$$d\theta = \frac{\partial\theta}{\partial\mu}\, d\mu + \sum_{i=1}^{j}\frac{\partial\theta 1}{\partial m_i}\, dm_i \quad (1)$$

Equation (1) describes two components: the "pure growth effect," reflecting growth's impact under a static income distribution (negative value indicates positive economic growth), and the "inequality effect," illustrating income redistribution's consequences within a stable societal income distribution (negative value benefits the impoverished, positive value benefits the affluent). Kakwani (1980) proposes a measure to assess changes in average income/consumption on the headcount ratio (pure growth effect), as under.

$$l'(P_0) = \frac{z}{\mu} \quad (2)$$

Here $l'(\rho)$ depicts 1st derivative of lorenz curve with respect to ρ and $P_0 = F(z)$ measures the headcount ratio. Assuming that Lorenz curve remains constant, differentiating equation (2) with respect to μ as follows

$$\frac{\partial P_0}{\partial\mu} = -\frac{z}{\mu^2 l''(P_0)} \quad (3)$$

Here $l''(\rho)$ is the 2nd derivative of $l(\rho)$ with respect to ρ.

Kakwani (1980) further computed that

$$l''(P_0) = \frac{1}{\mu f(z)} \quad (4)$$

Here $f(z)$ is the probability density function of income/consumption y at $y = z$.

The elasticity of poverty incidence with respect to mean/average income(consumption) can be obtained by substituting (4) into (3).

$$\eta_{P_0} = \frac{\partial P_0}{\partial\mu}\,\frac{\mu}{P_0} = \frac{zf(z)}{P_0} < 0, \quad (5)$$

Here η_{P_0} represents the proportion of individuals who transit above the poverty line as a result of one-percentage-point rise in average income /consumption while maintaining constant relative income distribution.

Considering a class of poverty measures that are additively separable.

$$\theta = \int_0^z P(z,y)f(y)dy, \tag{6}$$

Here

$$\frac{\partial P}{\partial y} < 0; \qquad \frac{\partial^2 P}{\partial y^2} \geq 0;$$

$P(z,y)$ is a homogeneous function of degree zero in z and y,
Substituting equation (2) into(6)

$$\theta = \int_0^{P_0} P[l'(P_0), l'(\rho)]dp \tag{7}$$

Differentiating θ with respect to μ (assuming fixed Lorenz curve ($l(\rho)$) gives

$$\frac{\partial \theta}{\partial \mu} = (P_0)\frac{\partial P_o}{\partial \mu} \int_0^z \frac{\partial p}{\partial y} yf(y) \tag{8}$$

By applying homogeneity property of $P(z,y)$

$$\frac{\partial P}{\partial z}z + \frac{\partial P}{\partial y}y = 0 \tag{9}$$

Simplifies into

$$\frac{\partial \theta}{\partial \mu} = \frac{\mu l''(h)}{z}\frac{\partial h}{\partial \mu}\int_0^z \frac{\partial p}{\partial y} yf(y)dy \tag{10}$$

Substituting equation (3) and (5) in equation (10) provides the elasticity of θ with respect to μ as follows:

$$\eta_\theta = \frac{1}{\theta}\int_0^z y\frac{\partial p}{\partial yk}f(y)dy \tag{11}$$

By considering a class of additive poverty measures, introduced by Foster, Greer and Thorbeceke (1984):

$$P_\alpha = \int_0^z \left(\frac{z-y}{z}\right)^\alpha f(y)dy \tag{12}$$

The parameter α represents inequality aversion. Using equation (11), the elasticity of P_α with respect to μ is calculated as.

$$\eta_{P_\alpha} = \frac{\partial P_\alpha}{\partial \mu}\frac{\mu}{P_\alpha} = -\frac{\alpha[P_{\alpha-1} - P_\alpha]}{P_\alpha} \tag{13}$$

For $\alpha \neq 0, \eta_{P_\alpha}$ has a negative sign as P_α is a monotonically decreasing function of α.
The elasticity of poverty measures derived above determines the size of the first component in equation (1), while the second component is estimated below.

Kakwani (1993) assumes that Lorenz curve shift as per the following formula:

$$l^*(\rho) = l(\rho) - \omega[\rho - l(\rho)] \tag{14}$$

When $\omega > 0(\omega < 0)$, , the Lorenz curve shifts downward or upward, resulting in higher or lower inequality. The ω parameter represents the percentage change in the Gini coefficient. For instance, if ω = 0.01 (-0.01), the Gini coefficient will increase (decrease) by 1%. Equation (2) facilitates the computation of the change in the headcount index from P_0 to ${P_0}^*$ due to inequality variation, without affecting average income. This allows quantifying the impact of changes in inequality on poverty, regardless of changes in average income or consumption.

$$l'^*({P_0}^*) = \frac{z}{\mu} \tag{15}$$

By differentiating with respect to ρ at $\rho = {P_0}^*$, yields

$$l'^*({P_0}^*) = l'({P_0}^*) - \omega[1 - l'({P_0}^*)] \tag{16}$$

Given the Lorenz curve $l(\rho)$, P_0 is the percentage of individuals with income equal to or less than z, such that

$$l'(P_0) = \frac{z}{\mu}$$

Substituting ${P_0}^*$ for P_0 in the equation above, z changes to the new level of z^* , such that

$$l'({P_0}^*) = \frac{z^*}{\mu} \tag{17}$$

By substituting equation (15) and (17) into (16) :

$$z^* = \frac{z + w\mu}{1 + \omega} \tag{18}$$

In this case ${P_0}^* = F(z^*)$ and $P_0 = F(z)$, indicating that the change in the Lorenz curve (as described in equation 14) represents a shift in the poverty line from z to z^* while the original consumption/income distribution remains unchanged. The Lorenz curve depicts the distribution of wealth or income within a population, demonstrating how different income groups receive a proportion of total income. Variations in the Lorenz curve can result from changes in the income/consumption distribution or changes to the poverty line. By comparing the original Lorenz curve to a shifted curve, researchers can determine how changes in the income distribution or the poverty line affect the overall poverty level in a population.

Equation (6) defines the θ class of poverty measures. If the income distribution's Lorenz curve shifts as per equation (14), the poverty measure undergoes the following transformation:

$$\theta(\omega) = \int_0^{z^*} P[\,Z, (1+\omega)y - \omega\mu]f(y)]\,dy \tag{19}$$

In this case, equation (18) provides z^*. Thus, the following formula can be used to determine the elasticity of θ with regard to the Gini index:

$$\epsilon_\theta = \frac{1}{\theta}\int_0^z \frac{\partial P}{\partial y}(y-\mu)f(y)dy \tag{20}$$

Above equation can further be solved by utilizing equation (11)

$$\epsilon_\theta = \eta_\theta - \frac{\mu}{\theta}\int_0^z \frac{\partial P}{\partial y}f(y)dy \tag{21}$$

In equation (21), the first term is negative, and the second term is positive. The second component must consistently surpass the first component for heightened inequality to result in amplified poverty. This criterion remains valid when the poverty line income is lower than the mean income, as shown in the equation. For Foster, Greer, and Thorbecke's poverty measures:

$$\epsilon_{P_\alpha} = \eta_{P_\alpha} + \frac{\alpha\mu P_{\alpha-1}}{zP_\alpha} \tag{22}$$

For $\alpha \neq 0$.

3.5.1. Inequality Growth Trade-Off:

Because both average income/consumption and income/consumption inequality can affect poverty, it is critical to consider the trade-off between the two. What percentage increase in average income or consumption would be required, for example, to prevent poverty from rising at all if the income distribution's Gini index increased by one percent? Alternatively, what is the trade-off between average consumption and inequality? This trade-off analysis can help policymakers and researchers better understand the relationship between income distribution and poverty, as well as inform the development of effective poverty-reduction and economic equality strategies. This can be determined by breaking down the proportionate change in poverty as described in the equation.

$$\frac{d\theta}{\theta} = \eta_\theta \frac{d\mu}{\mu} + \epsilon_\theta \frac{dG}{G}$$

The first term in this equation examines how poverty is influenced by average income/consumption, while the second calculates how changes in the Gini index of income/consumption inequality affect it. The growth-inequality trade-off index, also known as the marginal proportional rate of substitution (MPRS), can be calculated by setting the proportional change in poverty to zero.

$$\boldsymbol{Growth - Inequality\ Tradeoff\ Index = MPRS} = \frac{\partial \mu}{\partial G}\frac{G}{\mu} = -\frac{\epsilon_\theta}{\eta_\theta} \quad (23)$$

Which can be calculated for each poverty measure (P_0, P_1 and P_2).

4. Findings & Discussion:

4.1. Inequality-Growth Trade-Off (National Analysis):

The national analysis of the inequality-growth trade-off index is presented in Table 1. Key findings are outlined as under: From 2007-08 to 2018-19, the absolute elasticity of all poverty measures relative to average consumption surpasses 1, indicating that poverty will decrease more than average consumption rises if the distribution remains constant. The growth elasticity with respect to headcount incidence (P_0) in Pakistan increases from 1.86 in 2007-08 to 3.72 in 2018-19. Additionally, all poverty indicators (P_0, P_1 *and* P_2) become more sensitive to changes in average spending over time in Pakistan. The growth elasticity of poverty for $P_1$and P_2 exceeds that of P_0, implying that as the poverty measure's rank increases, so does its elasticity to economic growth. This suggests that economic growth can benefit the poorest more when accompanied by stable income distribution. The inequality elasticity of poverty incidence rises from 2007-08 to 2015-16 but remains constant in 2015-16 and 2018-19. In the case of headcount incidence (P_0), the growth elasticity exceeds the inequality elasticity throughout the study period, indicating greater sensitivity of the headcount ratio to changes in growth (average consumption) compared to changes in inequality (Gini coefficient). However, for the poverty gap ratio(P_1), during 2013-14 and 2015-16, the inequality elasticity surpasses the growth elasticity.

Conversely, the elasticity of severity of poverty (P_2) with respect to the Gini coefficient outweighs its elasticity with respect to average spending consistently from 2007-08 to 2018-19, highlighting the heightened sensitivity of ultra-poor individuals to changes in inequality compared to changes in growth. The inequality-growth trade-off index illustrates the amount by which an increase in average spending is required to counteract a 1% increase in the Gini index while maintaining a stable level of poverty. This trade-off for P_1 and P_2 exceeds that of P_0 and peaks in 2013-14, indicating a greater increase in average growth needed to offset increases in inequality among the ultra-poor.

Table 1: Poverty Elasticities And Inequality- Growth Trade-Off Index in Pakistan at Nation Level

Poverty Elasticity of Growth				Poverty Elasticity of Inequality			Inequality Growth Trade-Off		
Year	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2
2007-08	-1.86***	-2.88***	-3.62**	0.702**	2.46**	4.11***	0.38**	0.85**	1.135***
2010-11	-2.22***	-3.23**	-3.95**	0.96**	2.84**	4.59***	0.43***	0.8***	1.16***
2011-12	-2.46***	-3.71***	-4.55**	1.00***	2.92**	4.67***	0.4**	0.78***	1.02***
2013-14	-2.49***	-3.42**	-3.91**	1.83***	4.26**	6.35***	0.73***	1.24***	1.62**
2015-16	-3.16**	-4.34**	-5.05**	2.24***	4.78**	6.99***	0.7***	1.1***	1.38***
2018-19	-3.72**	-5.002**	-5.88**	2.24**	4.62**	6.75***	0.6***	0.92***	1.14***

Source: Authors Calculation using HIES survey (2007-08, 2010-11, 2011-12, 2013-14, 2015-16, 2018-19)
Note: *** indicate that the coefficients are statistically significant at 1% level of significance.** indicate that the coefficients are statistically significant at 5% level of significance.
For P_0, the inequality-growth trade-off index remained below 1 throughout the study period. However, forP_1, the index surpassed 1 in 2013-14 and 2015-16, and for(P_2), it exceeded 1 from 2007-08 to 2018-19. This indicates that more growth is needed to offset a 1% rise in the Gini coefficient's negative impact on inequality, particularly as the depth of poverty increases.

4.2. Inequality- Growth Trade-Off (Regional Analysis):

Table 2 depicts the inequality-growth trade-off at the regional level (urban and rural) in Pakistan from 2007-08 to 2018-19. Results show that the growth elasticity of poverty for all three measures (P_0 , P_1 , and P_2) is lower in urban areas compared to rural areas, indicating a greater reduction in poverty with increased average spending in rural region. Additionally, growth elasticity for P_1 and P_2 is higher than for P_0 in both urban and rural areas, with P_2 exhibiting the highest sensitivity to changes in average spending. In urban regions, growth elasticity with respect to P_0 and P_1 generally increases over the study period but declines in 2013-14, suggesting less responsiveness to increased spending during that time. In rural areas, growth elasticity with respect to P_0 increases steadily, while for P_1 , it declines in 2013-14, and growth elasticity for P_2 shows a fluctuating trend. Comparing growth elasticity and inequality elasticity in urban areas, growth elasticity for P_0 is generally higher than inequality elasticity except in 2015-16, while for P_2, inequality elasticity exceeds growth elasticity throughout, indicating a greater reliance of ultra-poor welfare on reduced inequality rather than increased average consumption.
In urban areas, inequality elasticity increases steadily over time for poverty incidence (P_0), shows a fluctuating trend for P_1, and decreases in 2011-12 before sharply rising in 2013-14 for P_2 . In rural areas, growth elasticity with respect to headcount incidence (P_0), exceeds inequality elasticity. Inequality elasticity rises forP_0, P_1 , and P_2 from 2007-08 to 2018-19, except for a slight decline in P_0 in 2011-12.
The inequality-growth trade-off index is higher in urban areas than in rural areas across all poverty measures, indicating a greater need for growth to counterbalance a 1% increase in inequality to maintain poverty stability in urban areas compared to rural areas. ForP_0, the trade-off is highest in urban areas in 2015-16 and in rural areas in 2013-14. Regarding P_1 and P_2 the trade-off peaks in 2013-14 in both urban and rural areas. Contributing factors to the rise in inequality include the energy crisis in 2012-13 and 2013-14, marked by power and gas shortages, along with other internal and external challenges, leading to night time load shedding across the country despite a reported generating capacity of 20,000 MW.
In 2013–14, power outages severely impacted exporters, particularly in the textile industry, crucial for Pakistan's energy sector. Synthetic textile fabric exports declined by 25.3% and woollen product exports fell by 5.1% from July to March 2012–13. Despite government efforts, circular debt increased, adding significant fiscal pressure. Simultaneously, the war on extremism exacerbated economic challenges, causing irreparable damage and disrupting societal peace. Energy shortages during 2012-13 to 2013-14 were fuelled by circular debt, declining gas production, and high reliance on oil and gas. Terrorist attacks in Karachi and other provinces led to widespread insecurity, impacting investment which dropped to 14.2%, down from the 2008 average of around 19.21%. These crises repeatedly tested the economy's resilience.

Table 2: Poverty Elasticities And Inequality-Growth Trade-Off Index (Regional Analysis)

	Poverty Elasticity of Growth			Poverty Elasticity of Inequality			Inequality Growth Trade-Off		
	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2
2007-08									
Urban	-1.57***	-1.98***	-2.14***	1.002***	2.088***	2.83**	0.63***	1.05**	1.32**
Rural	2.13***	-3.54***	-4.67***	0.48***	2.71***	4.96**	0.23***	0.81**	1.14**
2010-11									
Urban	-1.90***	-2.46**	-2.69***	1.13***	2.41**	3.39**	0.59***	0.97**	1.26**
Rural	-2.384***	-3.62***	-4.58***	0.84***	3.17***	5.45***	0.35***	0.87**	1.18***
2011-12									
Urban	-2.06**	-2.45***	-2.63***	1.242**	2.29***	3.07***	0.60***	0.93***	1.16**
Rural	-2.65***	-4.34**	-5.52**	0.82**	3.39***	5.86***	0.30***	0.78***	1.06***
2013-14									
Urban	1.39**	-1.96***	-2.62***	1.37***	3.31**	6.009***	0.98**	1.68**	2.29**

Rural	-3.05***	-4.15***	-4.56***	2.03***	5.39***	7.803**	0.66***	1.29***	1.711***
2015-16									
Urban	-1.82***	-2.13**	-2.20**	1.89***	3.04**	3.81**	1.03***	1.42**	1.73***
Rural	-3.99***	-5.53***	-6.59**	2.41***	6.15***	9.6***	0.60***	1.11**	1.45***
2018-19									
Urban	-2.32**	-2.69**	-2.84***	1.92**	3.04***	3.85**	0.82**	1.13***	1.35**
Rural	-4.51**	-6.23**	-7.51**	2.43***	5.85**	9.08**	0.53***	0.93***	1.20***

Authors Calculation using HIES survey (2007-08, 2010-11, 2011-12, 2013-14, 2015-16, 2018-19)
Note: *** indicate that the coefficients are statistically significant at 1% level of significance.** indicate that the coefficients are statistically significant at 5% level of significance

4.3. Inequality- Growth Trade-Off (Provincial Analysis):

From 2007-08 to 2018-19, the growth elasticity of headcount incidence (P_0) is lower than that of poverty gap (P_1) and severity of poverty (P_2) in all provinces except Khyber Pakhtunkhwa (KPK). Similarly, the inequality elasticity of headcount incidence(P_0) is lower than that of poverty gap (P_1) and severity of poverty (P_2) in all provinces throughout the period considered. This suggests that higher ranks of poverty measures are more sensitive to changes in average spending and changes in the Gini coefficient.

In Punjab, the inequality elasticity with respect to headcount incidence (P_0) increases consistently from 2007-08 to 2018-19, indicating a growing sensitivity of poverty incidence to increasing inequality over time. In Sindh, it also rises steadily over the period except for 2015-16. In KPK, it rises from 2007-08 to 2015-16, then declines in 2018-19.

On the other hand, the inequality elasticity of poverty gap in Punjab increases from 2007-08 to 2015-16 but declines in 2018-19. In Sindh, it fluctuates from 2007-08 to 2018-19. In KPK, it rises from 2007-08 to 2018-19, with a slight decline in 2013-14. In Baluchistan, it rises throughout the decade except for a slight decline in 2011-12.

The inequality elasticity with respect to severity of poverty (P_2) rises in Punjab from 2007-08 to 2015-16 but declines in 2018-19. In Sindh, it rises from 2007-08 to 2015-16 and declines in 2018-19. In KPK, it rises from 2007-08 to 2011-12, declines in 2013-14, then rises again in 2015-16 and 2018-19. In Baluchistan, it rises throughout the decade except for a slight decline in 2015-16.

During 2007-08, the highest growth elasticity of headcount incidence (P_0) is observed in KPK, while for P_1 and P_2 , it is highest in Baluchistan. The inequality elasticity of headcount incidence is highest in KPK, followed by Punjab, Sindh, and Baluchistan respectively. For poverty gap (P_1), Baluchistan exhibits the highest inequality elasticity, while Punjab has the lowest.

Table 3 (i): Poverty Elasticities And Inequality-Growth Trade-Off Index (Provincial Analysis)(i)

	Poverty Elasticity of Growth			**Poverty Elasticity of Inequality**			**Inequality Growth Trade-Off**		
	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2
2007-08									
Punjab	-1.76***	-2.631***	-3.36***	0.72***	2.40***	4.10***	0.409***	0.912***	1.22***
Sindh	-1.91***	-3.18***	-3.89***	0.68***	2.45**	3.91***	0.35**	0.77***	1.005***
KPK	-2.17***	-2.95***	-3.35***	0.82***	2.63**	3.93***	0.37***	0.89***	1.17***
Baluchistan	-2.04***	-4.23***	-6.05***	-0.152***	2.88**	6.44***	-0.074***	0.68***	1.06***
2010-11									
Punjab	-2.04***	-2.86***	-3.57***	0.99***	2.69***	4.42***	0.48***	0.94***	1.23***
Sindh	-2.41***	-3.61***	-4.33***	0.93**	2.91***	4.62***	0.38**	0.80***	1.06***

KPK	-2.39**	3.66***	-4.40***	0.89***	3.18***	5.17***	0.37***	0.86***	1.17***
Baluchistan	-2.88***	-4.49***	-5.26***	0.612***	3.96***	6.66**	0.21**	0.88***	1.26***
2011-12									
Punjab	-2.29***	-3.34***	-4.06***	1.04***	2.81***	4.43***	0.45***	0.84***	1.08***
Sindh	-2.69**	-3.99***	-4.92***	0.984***	2.91***	4.76***	0.36***	0.72***	0.96**
KPK	-2.55***	-4.17***	-5.13***	0.89***	3.23***	5.22***	0.34***	0.77**	1.01***
Baluchistan	-3.17***	-5.61***	-7.20***	0.40***	3.87**	6.93***	0.12***	0.68***	0.96***

Table 3 (ii): Poverty Elasticities And Inequality-Growth Trade-Off Index (Provincial Analysis)(ii)

	Poverty Elasticity of Growth			**Poverty Elasticity of Inequality**			**Inequality Growth Trade-Off**		
	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2
2013-14									
Punjab	-1.79***	-2.13***	-2.29***	1.78***	3.29***	4.59***	0.99**	1.53***	2.00***
Sindh	-3.24***	-4.75***	-5.27***	1.85***	5.23***	7.43***	0.57***	1.10***	1.40***
KPK	-2.82**	-2.86***	-2.81***	2.23**	3.68***	4.86***	0.79***	1.28***	1.72**
Baluchistan	-2.59***	-5.57***	-8.07**	0.813**	6.14**	12.81***	0.31***	1.10***	1.58***
2015-16									
Punjab	-2.99***	-3.75**	-4.07***	2.32***	4.43**	6.008***	0.77**	1.18***	1.47***
Sindh	-3.28***	-5.61***	-7.32***	1.82***	5.21***	8.53***	0.55**	0.92***	1.16**
KPK	-3.11**	-3.48*	-3.42***	2.723***	4.51***	5.42***	0.87***	1.29***	1.58**
Baluchistan	-4.29**	-7.02***	-9.28***	1.93***	7.00***	12.43***	0.45***	0.99***	1.33**
2018-19									
Punjab	-2.95**	-3.48***	-3.84***	2.16**	3.67**	4.908***	0.73**	1.05*	1.27***
Sindh	-3.86***	-5.66***	-6.90***	2.10***	4.98**	7.70***	0.54***	0.87***	1.11***
KPK	-3.90**	-5.17***	-5.78***	2.36***	4.86**	6.72***	0.60***	0.94***	1.16***
Baluchistan	-5.89**	-8.80***	-11.39***	2.10***	7.48***	13.158***	0.35**	0.85**	1.15***

Source: Authors Calculation using HIES survey (2007-08, 2010-11, 2011-12, 2013-14, 2015-16, 2018-19)

Note: *** indicate that the coefficients are statistically significant at 1% level of significance.** indicate that the coefficients are statistically significant at 5% level of significant.
Concerning severity of poverty (P_2,) Baluchistan shows the highest inequality elasticity, followed by Punjab, KPK, and Sindh.
In 2010-11 and 2011-12, Baluchistan and Sindh have higher growth elasticity of poverty incidence compared to Punjab and KPK, while Baluchistan and KPK have higher growth elasticity with respect to P_1 and P_2 compared to Punjab and Sindh. The inequality elasticity of poverty incidence is highest in Punjab and lowest in Baluchistan. However, for P_1 and P_2, it is highest in Baluchistan and KPK. In 2015-16, the inequality elasticity with respect to poverty gap is highest in Baluchistan, while for P_2, it peaks in 2013-14. Throughout this period, Baluchistan has the lowest inequality-growth trade-off index among the four provinces.
In 2013-14, Pakistan witnesses high income inequality, with the top 20% of the population sharing 40.3% of the total income, while the lowest 20% share only 9.3% of the total income (GoP, 2013-14).

5. Conclusion & Policy Implications:

The increasing elasticity of poverty with respect to average consumption indicates growing responsiveness of poverty to changes in economic growth over time. Higher elasticity of poverty with respect to growth for P_1 and P_2 at national, regional, and provincial levels (except for KPK) suggests that increased growth benefits the ultra-poor. Headcount incidence (P_0) is more sensitive to growth than inequality, while for poverty gap P_1 , particularly in 2013-14 and 2015-16, poverty elasticity with respect to inequality surpasses that with respect to average consumption. In the case of severity of poverty (P_2), higher inequality elasticity implies that ultra-poor individuals are more adversely affected by rising inequality than by increased average consumption.
The results of the inequality-growth trade-off index indicate that greater increases in average consumption are needed to offset rising consumption inequality among the ultra-poor. Additionally, growth decreases poverty (P_0, P_1, and P_2) more in rural areas compared to urban areas, with urban poverty being less responsive to changes in growth in certain years. Inequality elasticity of poverty generally increases over time at the regional level, indicating a growing tendency for inequality to exacerbate poverty. Higher values of the inequality-growth trade-off in urban regions than rural regions suggest a greater need for growth to counter rising inequality in urban areas.
In urban regions, inequality elasticity peaks in 2013-14. Higher values of the inequality-growth trade-off for P_1 and P_2 in 2013-14 in both urban and rural regions imply a rapid growth requirement to offset rising inequality for individuals far from the poverty line. Higher ranks of poverty measures exhibit greater sensitivity to changes in average spending and inequality across all provinces. Pakistan experienced high income inequality in 2013, with the top 20% of the population sharing a disproportionate 40.3% of total income compared to the lowest 20% sharing only 9.3%.In Punjab and Sindh, the inequality-growth trade-off index for headcount ratio and poverty gap index peaks in 2013-14. Contributing factors could include security concerns extending beyond terrorist attacks, with urban violence outbreaks in Karachi during this period. Among the four provinces, Baluchistan consistently shows the lowest inequality-growth trade-off index from 2007-08 to 2018-19.
It is recommended that to focus on reducing the poverty gap and the severity of poverty, inequality reducing policies will be more beneficial than growth policies. Appropriate measures should be taken for permanent social safety nets, capable of protecting Pakistan's most vulnerable populations from economic downturns and catastrophic events.Higher growth is required to compensate for the negative impact of rising inequality in urban regions than the rural regions.

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