Existence of Kuznets Curve in Pakistan: Evidence From HIES Data Set, 1993 To 2011

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Abstract

The economists take interest in knowing whether the relationship between inequality and growth is linear or quadratic (inverted U or U shape). This study estimates Random Coefficient Model using the pooled data including 9 HIES data set from 1993 to 2011, collected by Federal Bureau of Statistics, Government of Pakistan. The results support the Kuznets Hypothesis (Inverted U shape relationship between inequality and growth) in Pakistan.

Keywords: Inequality; Growth; Kuznets Hypothesis; Pakistan.

I. Introduction

The main concern of social scientists has been to find the relationship between inequality and growth since last three decades. A number of development economists explained the relationships between distribution of income and growth. Simon Kuznets (1955) was the first study which made a significant contribution in the theory of income inequality and growth. According to Kuznets Hypothesis inequality would rise in the beginning with growth, but will decrease in the later as the benefits of the growth trickle down to the poor income group.

After Kuznets pioneering work, several studies estimated the relationship using the cross country data and found empirical support in favor of Kuznets hypothesis. A few among them are Paukert (1973), Ahluwalia (1976), Papamek & Kyn (1987), Tsakoglou (1988), Randolph & Lott (1993), Jha (1996), Dawson (1997), Eusufzi (1997), Mubaku (1997) and Huang (2004). The comparability of cross country data was questioned by the Kanbar & Anand (1993b).

Deiniger and Squire (1996) compiled the consistent data set namely, "A new data set measuring income inequality" based on household surveys, including all sources of income that were representative of true population. Later on Deininger & Squire (1998) estimated the relationship between inequality and growth using data on 48 countries and found an inverted U shaped Kuznets curve in Brazil, Philippines, Hungry, Trinidad & Tobago and Mexico while the U shaped relationship was observed in United States, United Kingdom, India and Costa Rica. In remaining countries no significant relationship between the income inequality and growth was found. Barro (2000) found Kuznets curve using cross country analysis.

Huang et al. (2007) found the Kuznets curve evidence at most conditional quintile using cross-sectional data regarding seventy five countries from parametric quintile regressions. Further, inverted u shape relationship was found by estimating semi parametric quintile regression for countries where there is mild inequality; this relationship was not supported in countries having lower or higher inequality.

Bhandari et al. (2010) estimated the Kuznets curve conditioned by other economic and institutional factors related to income and growth on the 57 countries data set consisting from 1987 to 2006. Kim et al. (2011) probed the Kuznets hypothesis on cross state panel data set of United States over the period from 1945 to 2004. The study found long run co-integration relationship between income inequality and development. The U shaped relationship was found instead of inverted U. It means that inequality declines in start and then rises with economic development.

As far as Pakistan is concerned, a little effort has been made about the estimation of Kuznets curve. Thus, this study wants to find whether such like relationship between inequality and growth exists in Pakistan or not.

The rest of paper is organized as follows: following introduction, section II discusses the data and methodologies employed. The results are presented in the section III, while the final section draws some conclusions.

II. Data and Methodology

2.1 Data

This study utilizes the Household Income and Expenditure Survey (HIES) data set for the years 1992-93, 1993-94, 1996-97, 1998-99, 2001-02, 2004-05, 2005-06, 2007-08 and 2010-11 collected by Federal Bureau of Statistics (FBS) Pakistan. The sample size determined by FBS is representative at national and provincial level with rural/urban break up. This study uses mean per capita consumption expenditure as a proxy for growth and Gini coefficient as an inequality measure. These were estimated by applying the same methodology that was used in the Cheema and Sial (2010) and Cheema and Sial (2013). The descriptive statistics is presented below:

Table 1 Descriptive statistics

Variable		Mean	Std. Dev	Min	Max	Observation
Inequality	Overall	26.12	5.13	18.23	37.61	N = 72
	Between		4.98	20.41	32.66	n = 8
	Within		2.07	21.79	31.07	T = 9
RPCC	Overall	1348.769	821.2089	460.26	3957.2	N = 72
	Between		263.9143	1030.856	1738.102	n = 8
	Within		782.6757	289.5267	3609.93	T = 9

2.2 Methodology

The economists have shown much interest in estimating the relationship between inequality and growth. In order to estimate the concerned relationship following Methodology is applied.

Estimation of Kuznets curve

This study pools the data by taking eight observations- 1observation from Punjab urban (PU), Punjab rural (PR), Sindh urban (SU), Sindh rural (SR), Khyber Pakhtunkhwa urban (KPKU), Khyber Pakhtunkhwa rural (KPKR), Baluchistan urban (BalU) and Baluchistan rural (BalR) provinces from each survey over time consisting of 9 years making seventy-two observations in Pakistan where there are quite differences(Cultural, spending habits etc) among the provinces, and even between areas of urban and rural Pakistan. To test whether all the cross sections have the same slope, Chow test was applied which is given below.

Chow Test for Poolability

To test whether the data is poolable meaning if the slopes are the same across provinces, F-test is employed. The null hypothesis of this chow test is that the slope of a regressor is the same regardless of individual all k regressors, $H_0 : \beta_{iK} = K$. F test is given below:

$$F\left[(n-1)(k+1), n(T-k-1)\right] = \frac{(e'e - \sum e_i' e_i)/(n-1)(k+1)}{\sum e_i' e_i / n(T-k-1)} \sim F[(n-1)(k+1), n(T-k-1)]$$

$where\ e'e = SSE\ of\ \ pooled\ OLS$

$and\ e_i' e_i\ is\ the\ SSE\ of\ the\ OLS\ regression\ \ for\ group\ i$

$k = number\ of\ \ regressors$

The test rejected the null hypothesis of poolability. Thus this study concludes that the cross sections do not have the same slope for the regressors.

The same test is applied to know whether the data is poolable over time. Here the null hypothesis is that the slope is same over the time $H_0 : \beta_{tK} = K$. In this case the chow test is given below:

$$F\ statistics = \frac{(e'e - \sum e_t'e_t)/(T-1)(k+1)}{\sum e_t'e_t / T(n-k-1)} \sim F[(T-1)(k+1), T(n-k-1)]$$

$where\ e'e = SSE\ of\ pooled\ OLS$

$and\ e_t'e_t\ is\ the\ SSE\ of\ the\ OLS\ regression\ for\ time\ t$

$k = number\ of\ regressors$

Here also the chow test rejected the null hypothesis of poolability over time. Thus the slope of the regressors does not remain the same over time. When the slope of cross-sections is not constant, then the random coefficient model is the best choice. If the null hypothesis of poolability was not rejected, then the fixed effect and random effect models would have been the better choices. Thus, this study estimates the random coefficient model that is given below:

Random Coefficient Model

$$LnGini_{it} = \beta_0 + \beta_1 Average\ \exp enditure_{it} + \beta_2 (Average\ \exp enditure_{it})^2 + \eta_{1i} + \eta_{2i} + \eta_{3i} + \varepsilon_{it}$$

$$H_0 : \beta_1 = \beta_2 = 0$$

$$H_1 : \beta_1 > 0\ \ \&\ \ \beta_2 < 0$$

This can be written as:

$$LnGini_{it} = (\beta_0 + \eta_{1i}) + (\beta_1 + \eta_{2i})(Average\ \exp enditure_{it}) + (\beta_2 + \eta_{3i})(Average\ \exp enditure_{it})^2 + \varepsilon_{it}$$

$$H_0 : \beta_1 = \beta_2 = 0$$

$$H_1 : \beta_1 > 0\ \ \&\ \ \beta_2 < 0$$

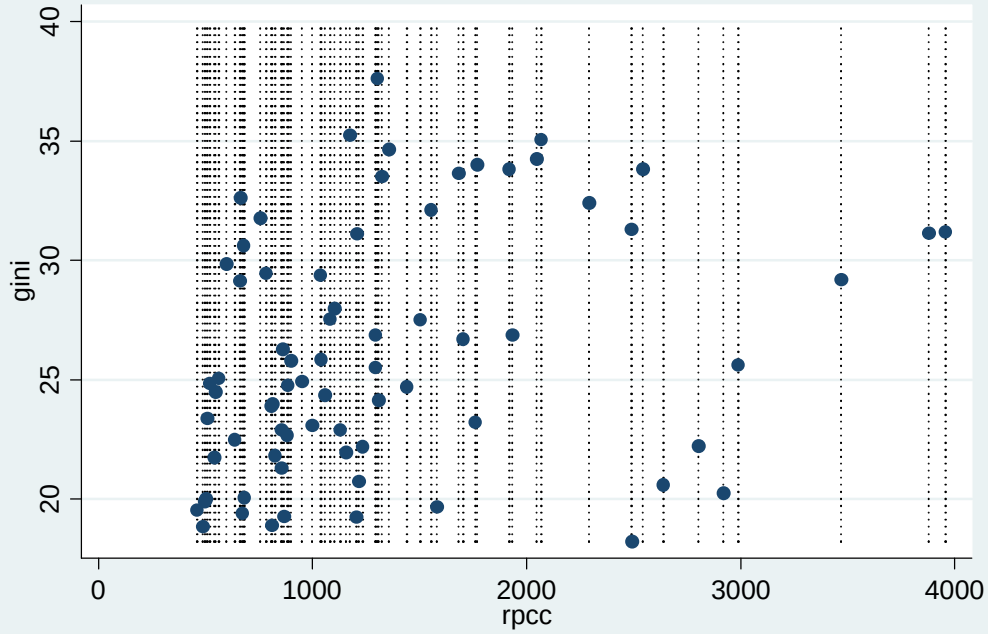
Where (1) i=1,2,3 …N refers to cross section of Provinces; (2) t=1,2,3 … T refers to the number of years; (3) $Gini_{it}$ denotes Gini coefficient in province i in year t; (4) average $expenditure_{it}$ denotes average expenditure in province i in year t. μ_{1i} is cross section-specific intercept, μ_{2i} and μ_{3i} are cross section-specific slopes and ν_{it} is error term such that $\nu_{it} \sim$ IID (0, σ2 for all i and t).

III. Results and Discussions

3. Relationship between inequality and growth/ Kuznets curve estimation

During the growth process inequality may increase, decrease or remain constant. Increasing inequality hurts the poor, while decreasing inequality helps the poor. Thus, it is essential to estimate the relationship between inequality and growth over time. The graph of the relationship between inequality and growth is presented in the figure 1.

Figure 1: Inequality and growth relationship in Pakistan 1993-2011



Author's own calculations

The graph supports the Kuznets inverted u shape relationship between inequality and growth in Pakistan. When the data is being pooled to estimate this relationship through econometric approach, it is necessary to confirm whether the data is poolable or not (i.e., meaning if the slopes of the regressors are same across province/over time). For this the study applies the chow test whose results are shown in the table 2.

Table 2. Poolability test results

	F statistics
Cross section	21.09
Time	12.63

The above table shows that the results reject the null hypothesis that all the cross sections/times have the same slope. It implies that all the cross sections and times have different slopes. So the Random coefficient Model is the best choice and it is estimated. The study also employs the diagnostic tests. The results of diagnostic tests and random coefficient model are presented in the table 3.

Table 3. long run relationship between inequality and growth	
Variables	Estimates
Constant	3.08^ (42.29)* (0.00)**
Average per adult equivalent expenditure	0.32^ (3.36) (0.01)**
Squared mean per adult equivalent expenditure	-0.16^ (-3.16)* (-0.01)**
Diagnostic Tests	
Autocorrelation Wooldridge (p-value)	 0.93 (0.36)**
Heteroscedasticity LR test (p-value)	 29.97 (0.00)**

^ coefficients are elasticities *z-values, **p-values
Note: z values are based on heteroskedasticity corrected standard errors.

The above table 3 shows that the sign of mean expenditure is positive, while that of squared mean expenditure is negative validating the Kuznets hypothesis in Pakistan meaning that during the growth process inequality first increases and then decreases. The coefficient of mean expenditure and squared mean expenditure are statistically significant at less than 5 percent. The results at cross section level presented in the table 4 also support the Kuznets inverted U relationship between inequality and growth in Pakistan. This relationship between inequality and growth was statistically significant among all the cross sections except Punjab rural and Sindh rural.

Table 4. Relationship between inequality and growth at cross section level in Pakistan, 1993-2011								
Variables	PU	PR	SU	SR	KPK U	KPK R	BAL U	BAL R
Constant	3.32 (51.03)* (0.00)**	3.13 55.55)* (0.00)**	3.25 (51.84)* (0.00)**	3.09 (31.95)* (0.00)**	3.20 (39.12)* (0.00)**	2.82 (39.33)* (0.00)**	2.91 (43.01)* (0.00)**	2.90 (32.45)* (0.00)**
rpcc	0.31 (2.16)* (0.03)**	0.17 (1.67)* (0.10)**	0.54 (3.12)* (0.00)**	0.004 (0.03)* (0.97)**	0.40 (2.40)* (0.02)**	0.02 (3.81)* (0.00)**	0.57 (4.74)* (0.00)**	0.23 (1.68)* (0.09)**
rpccsq	-0.15 (-1.82)* (0.07)**	-0.07 (-1.45)* (0.15)**	-0.02 (-2.63)* (0.01)**	-0.02 (-0.32)* (0.75)**	-0.19 (-2.06)* (0.04)**	-0.21 (-3.67)* (0.00)**	-0.29 (-5.12)* (0.00)**	-0.11 (-2.15)* (0.03)**

*z-values, **p-values
PU= Punjab urban PR=Punjab rural SU= Sindh urban SR=Sindh rural
KPK U=Khyber Pakhtoon Khaw urban KPK R= Khyber Pakhtoon Khaw rural
BAL U=Baluchistan urban BAL R=Baluchistan rural
rpcc=real per capita consumption expenditure
rpccsq=square of real per capita consumption expenditure
Note: coefficients are elasticities

IV. Conclusion and Policy Implication

This study estimated the Random Coefficient Model to ascertain the long run relationship among income inequality and growth using the pooled data from nine household income and expenditure surveys (HIES) conducted between1993 to 2011 in Pakistan. The results show that inequality increases up to a limit, and then it starts to decline supporting the existence of inverted U Kuznets curve in Pakistan. At a policy level, it is suggested that policies focusing on growth be implemented in true letter and spirit by the government of Pakistan.

It is hoped that the present study would make a modest contribution in the existing literature on inequality and growth as well as on long run relationship between inequality and growth particularly in Pakistan in the following way:

1. This study developed consistent time series on inequality and mean expenditure in urban, rural, provinces and overall Pakistan from 1993 to 2011. The composite price index that consists of the merits of both tornqvist price index (TPI) and consumer price index (CPI) was used to adjust the mean expenditure of 1998-99 to get it for the remaining years. The study provides enough data for inequality and mean expenditure for further analysis and related issues in Pakistan.
2. The Kuznets curve has never been estimated in Pakistan. Thus, this study is a significant contribution in literature on Kuznets curve estimation.

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