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Agricultural Growth, Rural Poverty and Income Inequality in Pakistan: Emerging Evidences

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Abstract

The recent analyses of large international and interregional data sets show that the structure of the growth is a major factor in explaining the bulk of poverty reduction. The structure of growth does indeed matter very much. The skewed distribution in income and land not only slows down growth but also shows growth does not help in reducing poverty. The substantial empirical evidence suggests that a high inequality in income is not conducive to either economic growth or poverty reduction. In this study, an innovative effort and empirical evidence is presented to visualize the long term impact of agricultural growth and inequality on rural poverty in Pakistan. The experience of Pakistan's rural economy in the 1990s reveals that agricultural growth has not significantly translated into poverty reduction. In rural Pakistan, one percent increase in average household income reduces poverty (HCR) by 0.25 percent. Regression model reveals that one percent increase in income inequality and average income in rural areas of Pakistan leads to an increase and decrease in poverty at the rate of about 0.31 and 0.27 percent respectively. The policy directions taken from these findings show that any effort to reduce rural poverty in the country must be in tandem with the controlling inequality so that the potential benefit of sustainable growth could be reaped.

Key Words: Agricultural growth, Rural poverty, Income inequality, Pakistan

Introduction

The relationship between agricultural growth and rural poverty lies at the heart of development economics. One school of thought see growth of the macroeconomy as both necessary and sufficient for reduction in the incidence and severity of poverty, and subsequently focus their efforts on achieving the desired macroeconomic outcomes.

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The other school of economic philosophers stress on the fact that benefits from agricultural growth may be very evenly spread. In fact, growth at aggregate level may well have an adverse blow to the most vulnerable segments of society. Thus the redistributional impact of growth needs to be taken into account when considering the consequences of poverty (Hoeven and Shorrocks, 2003).

The recent analyses of large international and interregional data sets show that the structure of the growth is a major factor in explaining the bulk of poverty reduction. The structure of growth does indeed matter very much. The skewed distribution in income and land not only slows down growth but also shows growth does not help in reducing poverty. The substantial empirical evidence suggests that a high inequality in income is not conducive to either economic growth or poverty reduction. Agricultural growth where there is a low concentration of land ownership and labor-intensive technologies are used has almost always helped reduce poverty. Sharp drops in economic growth resulting from shocks and economic adjustments may increase the incidence of poverty. Even when growth resumes, the incidence of poverty may not improve if inequality has been worsened by the crisis.

Ravallion and Chen (2002) defined growth as pro-poor if it reduces poverty. Dollar and Kraay (2001) opined that a positive economic growth benefits the poor to the same extent that benefits the whole economy. Similarly Knowles (2001) finds a significant negative effect of inequality on growth. The traditional interpretation of basic data led to the conclusion that in the early stages of economic growth, inequality tended to first increase and only in later stages of growth it decreases. This pattern is often called a J curve, for its distinctive shapes, or the Kuznets Curve (Kuznets, 1955). A range of literature from 1971 to 1995, covering developing countries, seemed to support the Kuznets hypothesis about worsening of income distribution in early stages of growth.

Foster and Szekely (2000) showed that growth elasticity of the general means can vary from 1.08 to extremely low. They concluded that the positive value of elasticity indicates that growth is good for

the poor. The Foster-Szekely approach provides an important bridge to the design of welfare measures sensitive and incorporating poverty and inequality- a high priority in the research agenda in development economics.

The elasticity of poverty reduction with respect to GDP growth applied by the World Bank is 2.12 (Burno, Ravallion and Squire, 1998). On the other hand, one percent increase in GDP growth rate, the proportion of the population falling under the poverty line, reduced by 2.12 percent. Generally, six to eight percent growth rate can achieve OECD/DAC targets for income poverty reduction. However, the variance in the average elasticity of poverty reduction with respect to GDP growth is very large. GDP growth only explains 37 percent of poverty reduction, with a massive 63 percent left to be explained by other factors.

Experience of agricultural growth in Pakistan

The issues of rural poverty and income inequality are difficult to comprehend without thorough examination of several interrelated aspects of changes in the agriculture sector. To understand the impact of agricultural growth on poverty in rural areas, it is quite important to appraise first the nature of growth process itself. The agricultural crisis of the 1950s revealed stagnant farm productivity and the rate of growth of population started to gather momentum. Increased incidence of water logging and salinity and adverse government policies relating to agricultural prices and provision of infrastructure also contributed to the low growth of agricultural output. Moreover, rapid industrial growth at the expense of agriculture was a major strategy of economic development followed by the government. The robust growth of agriculture output and productivity in 1960s was attributed to the development of water resources in the public sector and installation of private tube-wells, spread of new seeds of wheat and rice, and incentives through price support and subsidies on inputs like fertilizers and institutional credit. There is some evidence that the distributive effects of increased agricultural growth were not benign since the farming community was highly differentiated by land ownership, access to land and employment opportunities.

Thus, the question arises that why did the agricultural growth of 4 percent in the 1980s led to sharp decline in poverty and a more rapid increase in 1990 led to an increase in poverty. It has been observed that during the 1990s capital and labour in agriculture sector grew at rates of 2.21 and 0.81 percent respectively. Since output grew by 4.54 percent, the residual Total Factor Productivity (TFP) showed an increase of 1.52 percentage points. These estimates show that one half of growth is attributed to capital, 33.6 percent is due to changes in TFP. The contribution of labour was only 17.8 percent to the growth of output in the 1990s (Kemal, 2002).

During 1990s, the public policy was directed to support prices of various agricultural commodities but most of the time they were much below the world market prices. Until recently they were essentially procurement prices rather than support prices. At the same time, government provided subsidies to various agricultural inputs, including fertilizers, pesticides, tube wells, credit etc. Nevertheless terms of trade were against agriculture and growth of the sector was less than optimal. More, over Pakistan implemented structural adjustment and stabilization programmes which called for removal of subsidies. This increased the cost of production of the farmers and to compensate them the support prices of agricultural products were increased. The export duties on cotton and rice were removed and support prices of all the products including the wheat ere enhanced. This did increase the terms of trade for agriculture, but its impact on small and large farmers was different. The benefits of small producers are relatively much smaller because their market surplus is only 30 percent (Kemal, 2002) and is disproportionately biased towards the large farmers (Kemal, 2003).

The introduction clearly raises alarming questions which requires in-depth academic pursuit in order to develop policy scenarios. The questions are: Why growth has become anti-poor in rural Pakistan? To what extent the poor of rural Pakistan benefit from economic growth? Why our rural poor are not enjoying "trickle down" impact of agricultural growth? Has the agriculture sector not been able to generate sufficient employment leading to an increase in poverty level in rural areas? Is it possible for us to chase the target of halving poverty till 2015 as set under MDGs?

In this study, an innovative effort and empirical evidence is presented to visualize the long term impact of agricultural growth and inequality on rural poverty in Pakistan. The study analyses the long run relationships between agricultural growth, rural poverty and income inequality by first setting a consistent time series on rural poverty, inequality and average income of rural households by using Household Integrated Economic Surveys (HIES) data from 1990-91 to 2000-01.

Materials and Methods

Method in the measurement of impact of growth on poverty

Kakwani (1993) developed a methodology to measure the impact of changes in average income and income inequality on poverty by deriving some analytical formulae. His methodology gives only point elasticity by use of single survey and it requires the knowledge of the probability density of income at the poverty threshold, which is not always available.

Datt and Ravallion (1992) provided another, much simpler method to decompose change in poverty into

growth and inequality components. This method no doubt works under minimum assumptions about the functional form of Lorenz curve or the probability distribution, but it provides a measure of short-run relation. A possible way to overcome these entire shortcomings is to use the regression equation of the following form for rural areas of Pakistan.

$$\ln HCR = a_0 + a_1 \ln APCI + \gamma T + \varepsilon_{at} \quad (3.1)$$

Where:
HCR = Head Count Ratio
APCI = Average per Capita Income
a_0 = Fixed effect
a_1 = Growth elasticity of Poverty
γ = Trend rate of change in poverty due to time
AR = Autocorrelation Coefficient
ε_{at} = random errors in poverty measure

A time series analysis of poverty and growth on single country data was previously not possible for developing countries (India and Bangladesh are rare exceptions). A majority of studies attempting to quantify this relation had to rely on cross country data where country specific effects, and hence resultant hetroscedasticity, could not be controlled. The present study is free from this problem and the control over area specific effects is achieved if they at all exist within the country. As far as the consistency of data across the surveys, and the choice of estimation technique are concerned, we realize that the observed values of average per capita income APCI and head count ratio HCR may not be the true values. That is, we have a sort of errors in the variables problem. It is arising from variation in questionnaires used over time, variations in ways to ask questions, income imputation techniques that have changed over the years, sample size, area of coverage of a survey, variation in the time lags from one survey to the next as well as differences in the socio-political environments between various surveys that can influence the answers. These factors create problems in obtaining consistent estimates of long run elasticities. But, by taking cognizance of the problem and adopting appropriate approach, these can be controlled much more easily than such problems in the cross country data derived from very different surveys with so many different sources of errors.

Assume that the observed values are proxies for the true values.

$$\text{Ln HCR} = \text{LnHCR}^* + \mu_{at} \quad (3.2)$$
$$\text{Ln APCI} = \text{Ln APCI}^* + \upsilon_{at} \quad (3.3)$$

where HCR is Head Count Ratio (Poverty Measure) and APCI is Average per capita Income (proxy of agriculture growth), υ_{at} is random error term that is iid over time. Note that the errors μ_{at} does not pose any problem in the error term of poverty, ω_{at} in case of equation 1. It is the error υ_{at} in Ln APCI that pose a problem of stochastic regressors and rendering the OLS estimates biased and inconsistent. By substituting equation 3 in equation 1, the error term for the resultant equation becomes correlated with the explanatory variable, hence violation of OLS assumption.

$$\ln HCR = a_0 + a_1 \ln APCI + \gamma T + (\varepsilon_{at} + a_1 \upsilon_{at}) \quad (3.4)$$
$$\text{Where:} \quad \varepsilon_{at} = \omega_{at} + \mu_{at} \quad (3.5)$$

Ravallion and Chen (1997) using cross country data to estimate the relationship between poverty and growth could not control for the country specific effects but they were able to control for time varying error factor. We will utilize the same argument here which is simple but innovative. According to them, since each pair of data on growth and poverty variables obtained from the same survey, therefore if a survey over (under) estimates average per capita income than its true value, then estimation of household count presumably will be lower (higher) than its true value. Therefore, ω_{at} and υ_{at} will be negatively correlated. This along with a simplifying assumption removes the problem of stochastic regressors and OLS method can be applied.

Method in the measurement of impact of inequality on poverty

In order to arrive at the total elasticity of poverty-which determines the extent of country's poverty reduction-the impact of inequality on poverty was also checked by operating the same regression apparatus given below:

$$\ln (HCR^*_{at}) = c_0 + c_1 \ln(Gini^*_{at}) + c_a + \xi_{at} \quad (3.6)$$

Where
Gini = Inequality Index
HCI = Head Count Ratio
c_0 = Fixed effect
c_a = area random effect
c_1 = inequality elasticity of poverty.
ξ_{at} = random errors in inequality measure that are iid over time.

Method in the measurement of impact of growth and inequality on poverty

Finally the estimation of interrelationship between agricultural growth, inequality and rural poverty is made by framing the following equation.

$$\ln HCR = d_0 + d_1 \ln GINI + d_2 \ln APCI + \gamma T + AR(1) + \varepsilon \quad (3.7)$$

where HCR = Head Count Ratio, GINI = Inequality Coefficient, d_0, d_1 and d_2 are parameters to be estimated, d_0= Fixed effect, d_1 = Inequality Elasticity of Poverty, d_2 = Growth Elasticity of Poverty, γ = Trend rate of change in poverty due to time, AR = Autocorrelation Coefficient and ε = random errors in poverty measure.

Results and Discussion

Impact of agricultural growth on rural poverty

There is no denying the fact the agricultural growth is an effective anti-poverty tool. But the extent to which growth benefits the poor depends upon trickle down a number of factors on the agrarian economy. The experience of Pakistan's rural economy in the 1990s reveals that agricultural growth has not significantly translated into poverty reduction. The time series regression equation is estimated in long linear function relationship. The estimating equation is:

$$\ln HCR = a_0 + a_1 \ln APCI + \gamma T + AR(1) + \varepsilon \quad (4.1)$$

Where HCR = Head Count Ratio, APCI = Average per Capita Income, a_0 and a_1 are parameters to be estimated, a_0 = Fixed effect, a_1 = Growth Elasticity of Poverty, γ = Trend rate of change in poverty due to time, AR = Autocorrelation Coefficient and ε = random errors in poverty measure.

Table 1 reflects that in rural Pakistan, one percent increase in average household income reduces poverty (HCR) by 0.25 percent. NWFP is the only province where agricultural growth trickles down to the rural poor relatively better. The growth elasticity of poverty in this province has been -0.28 between the year 1990-91 and 2000-01. This is the only province where Durban Watson Statistics (Rho is quite nominal) is comparatively better than the other provinces and rural Pakistan. In Balochistan the effect of growth is negligible. The coefficient of elasticity is -0.02 and that too is insignificant. Thirtle *et al* (2001) found that for a sample of 40 countries, the elasticity of incidence of poverty to agricultural productivity growth was about one percent, that is , the percentage of those living below the dollar a day poverty line fell by close to one percent for every percentage increase in agricultural productivity growth.

Ali and Tahir (1999)[1], estimated long time (1964-94) coefficient of elasticity as -0.77 in rural Pakistan indicating a larger trickle down effect of agricultural growth in reducing poverty as compared to the present study. This perhaps is due to decline in the real wages among low-wage workers in rural areas and reduced employment of totally unskilled labour in the agriculture sector throughout the 1990 decade.

Impact of inequality on rural poverty

The relationship of income inequality with poverty is estimated by the following equation.

$$\ln HCR = b_0 + b_1 \ln GINI + \gamma T + AR(1) + \varepsilon \quad (4.2)$$

where HCR = Head Count Ratio, GINI = Inequality Coefficient, b_0 and b_1 are parameters to be estimated, b_0= Fixed effect, b_1 = Inequality Elasticity of Poverty, γ = Trend rate of change in poverty due to time, AR = Autocorrelation Coefficient and ε = random errors in poverty measure.

[1]Durban Watson Statistics in this study are less reliable than that of our results.

Table 2 shows that inequality elasticity of poverty is relatively inelastic i.e. the coefficient of elasticity is less than one. Pakistan's rural scenario shows that one percent increase (decrease) in the income inequality, poverty increase (decrease) by 0.24 percent. In Punjab and NWFP, the impact of income inequality on poverty is very nominal while higher in rural Sindh where the coefficient of elasticity is 0.39. However, in Balochistan, rise in income inequality is reducing poverty. Thus the likely impact of inequality on poverty in rural areas of Pakistan for the 1990's decade is inconclusive.

Impact of Agricultural Growth and Inequality on Rural Poverty

Economic growth helps to raise long term or permanent incomes, and it is therefore a necessary condition to pull poor people out of poverty permanently, although it is by no means a sufficient condition. For example, the poverty impact of growth could be eaten up if inequality level and population growth rates are very high. The previous models described the impact of growth on rural poverty and also inequality on rural poverty. The separate estimation was necessary to generalize the results of trickle down effect of growth to the poor. The results provide good intuitive sense but due to the inconsistency, non-reliability and some inconclusive results, policy parameters are difficult to derive. Thus estimation of interrelationship between agricultural growth, inequality and rural poverty is made by framing the following equation.

$$\ln HCR = d_0 + d_1 \ln GINI + d_2 \ln APCI + \gamma T + AR(1) + \varepsilon \quad (4.3)$$

Where HCR = Head Count Ratio, GINI = Inequality Coefficient, d_0, d_1 and d_2 are parameters to be estimated, d_0= Fixed effect, d_1 = Inequality Elasticity of Poverty, d_2 = Growth Elasticity of Poverty, γ = Trend rate of change in poverty due to time, AR = Autocorrelation Coefficient and ε = random errors in poverty measure.

Table 3 reveals that one percent increase in income inequality and average income in rural areas of Pakistan leads to an increase and decrease in poverty at the rate of about 0.31 and 0.27 percent respectively. It indicates that the impact of inequality in increasing poverty is a somewhat greater than that of growth in average income in reducing rural poverty. These results vary at the provincial level. The coefficient of inequality elasticities of poverty in Punjab and Balochistan is negative showing fall in poverty. But such results are found to be non-significant at 5 percent level. In Sind, the coefficients of inequality and growth elasticities are 0.27 and -0.16 while the impact of income inequality in reducing poverty in rural NWFP is quite nominal.

The results are more intuitive and significant in this collective model as compared to the results derived separately. The goodness-of-fit is also relatively better and these findings are in line with the previous research. Ali and Tahir (1999) concluded that one percent rise in income inequality leads to 0.89 percent increase and 0.31 decrease in poverty in rural Pakistan (1964-1994)[1]. The comparison shows that in this study (1990 to 2001), the negative impact of income inequality on poverty in rural Pakistan decreases while the positive impact of growth in average household income remains stable. The findings further pinpointed the pro-poor/anti-poor estimate scenarios in Pakistan and the provinces to arrive at a meaningful conclusion.

[1]Durban Watson Statistics in this study are less reliable than that of our results.

Table 1: Regression of rural poverty on agricultural growth

Regression Coefficients/ Statistics	Pakistan	Punjab	Sind	NWFP	Balochistan
a_0	5.35***(6.69)	5.09**(14.97)	5.13**(6.37)	5.63**(10.06)	3.56**(13.03)
a_1	-0.25** (-2.41)	-0.21* (-4.97)	-0.22** (-1.97)	-0.28** (-3.69)	-0.02* (-.01)
Adj. R^2	0.91	0.98	0.94	0.96	0.98
D.W.	1.31	1.78	1.64	2.05	1.42
ρ	0.38	0.08	0.21	-0.0014	0.49

Table 2: Regression of rural poverty on inequality

Regression Coefficients / Statistics	Pakistan	Punjab	Sind	NWFP	Balochistan
b_0	2.50** (1.12)	3.03*** (2.98)	1.94** (1.32)	3.31** (1.18)	3.90** (12.11)
b_1	0.24*** (0.64)	0.10*** (1.77)	0.39** (3.25)	0.05* (2.22)	-0.14** (-2.47)
Adj. R^2	0.84	0.88	0.93	0.85	0.98
D.W.	1.25	0.97	1.04	0.88	1.63
ρ	0.47	0.83	0.51	0.46	0.05

Table 3: Regression of rural poverty on inequality and agricultural growth

Regression Coefficients / Statistics	Pakistan	Punjab	Sind	NWFP	Balochistan
d_0	4.61*** (2.38)	5.14** (5.20)	3.68** (1.50)	5.42** (2.99)	3.92*** (10.74)
d_1	0.31** (1.55)	-0.01* (-0.63)	0.27** (2.69)	0.06** (2.80)	-0.22** (-2.71)
d_2	-0.27* (-2.99)	-0.21** (-4.77)	-0.16* (-0.99)	-0.27* (-3.07)	0.03*** (1.60)
Adj. R^2	0.94	0.97	0.95	0.96	0.98
D.W.	1.71	1.79	1.42	2.01	1.60
ρ	0.08	0.06	0.59	0.09	0.23

The coefficients are based on OLS estimation while t-values are in parenthesis, which are based on robust standard errors after correcting for autocorrelation using AR (1) Cochrane-Orcutt iterative procedure.

* Significant at 99 percent confidence level; ** Significant at 95 percent confidence level; *** Significant at 90 percent confidence level; Adjusted R^2 is based on original OLS method; ρ estimate of autocorrelation coefficient in errors.

Conclusions and suggestions

The regression model depicting the interrelationship among agricultural growth, rural poverty and income inequality suggests that one percent increase in income inequality and average income in rural areas of Pakistan leads to an increase and decrease in poverty at the rate of about 0.31 and 0.27 percent respectively. It indicates that the impact of inequality in increasing poverty is a somewhat greater than that of growth in average income in reducing rural poverty. These results vary at the provincial level. The rural poverty can be reduced through pro-poor interventions including redistribution of land and water resources. The development of non-farm sector is imperative for the poor and landless through small and medium enterprises and skill improvement and vocational training. The policy directions taken from these findings show that any effort to reduce rural poverty in the country must be in tandem with the controlling inequality so that the potential benefit of sustainable growth could be reaped.

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