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Land Inequality, an over the years trend:A District Level Analysis of Punjab Province, Pakistan

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Abstract. A Gini Coefficient has been implied to measure the inequality in distribution of land in 34 districts of Punjab province, Pakistan. There are large regional inequalities in distribution of land. Based on the study further policy options are proposed including: reducing the market imperfections; land reforms to re-distribute the land assets to landless farmers and the marginal farmers.

Keywords: *land distribution, land inequality.*

Introduction

In the recent past, with food security becoming a major concern in poverty alleviation and development efforts, the importance of agriculture sector as a subject for analysis has risen enormously. As consequences of increasing population and operation of the law of inheritance, land holdings are being increasingly fragmented. At the same time, inequalities in the distribution of land because of imperfections in the functioning of land market are on the rise. These inequalities may have some serious consequences and implications for the development of not only the agriculture sector but also for the economic growth. As the farm productivity is the key issue in agricultural development, both in the developed and developing countries, it has attracted much attention in the literature on economic development in general and agricultural development in particular. The literature on development underscores the importance of increasing productivity and efficiency of resource use in general and in agriculture in particular. In this context it is important to examine the role of institutional factors like farm size and land distribution. However, the impacts of institutional factors like distribution of land among various holdings, land concentration and farm size on

production and productivity have received much less attention. Unfortunately there is no considerable study available measuring the degree of inequality among the farmers in particular context of Pakistan and in general for the rest of the world. It is in this context and with this background that the current study has been designed to examine the inequality in distribution of land for the 34 districts of Pakistani Punjab province. In Pakistan, Punjab plays an important role in the overall supply of food and for assuring food security to the over 180 million population country looks to agricultural production and its exports. So the measuring of degree of inequality in land distribution as a key factor affecting the agricultural productivity of Punjab can help policy makers in charting future course of development strategies and programs.

Unfortunately, in Pakistan, even being the agrarian economy the issue of size of land holdings and its relationship with the agricultural productivity could not gain the required attention. Only few studies are available addressing the issue of land holding size and its relationship with the agricultural productivity. Gill and Sampath (1992) found that inequality in distribution of land has been increased because of three reasons; an increased trend of self cultivation as it was more profitable after green revolution, forced withdrawal of the beneficiaries of 1960's land reforms from their tracts and lastly the adjustment made by the landed class after the land reforms.

Gill and Sampath (1992) concluded in a study that for the prevailing inequality in the irrigation distribution based on the land holding size as a source of inefficient agricultural output. They used the data both for national and province level for the unequal land distribution, irrigation related variables across the land holding size and among the agriculture household.

Ahmad *et al* (2003) argued that pattern of ownership and size of land holdings in Pakistan are major factors that depress not only economic well being but also the determinants of social and political status of the rural communities. Study using the data from three census reports 1970, 1980, and 1990 for NWFP calculated Gini Coefficients and found land distribution highly skewed.

Haq (2007) using data from 1990 and 2000 census reports analyzed the distribution of cultivated area across provinces and by mode of irrigation. The

study found high inequality in land holdings and access to irrigation across the provinces

Adika (2008), found a negative but significant correlation between farm size and output per cultivated acre. Study concluded that the small and large farm holdings are more productive than the middle sized farm holdings.

In some of the studies Gini coefficient has been used as a measure of inequality of the operational holding size. Literature show that inequality in holding size negatively related to agricultural productivity per hectare. In cross country analysis literature show that countries with more equitable land distribution were more productive as compared to the countries with the less equitable land distribution (Johnston and Kilby 1975; Tomich, Johnston and Kilby 1995).

Methodology:

Only a limited number of studies have examined the issue of inequality in land holdings and impact of land distribution (e.g. Vollrath 2004 and 2007) on agricultural productivity. These mentioned studies on the role of inequality in land holdings suggest Gini coefficient as a measure of the operational holdings size among the different classes of farmer.

Measuring Land Distribution

Inequality in land distribution refers to a situation where a large proportion of land is concentrated in a small group of large farms while a great majority of small farms operate only a small fraction of total farm area. Following the description of income inequality we may define inequality in land distribution as the availability of a disproportionately large share of total land to a tiny fraction of all farmers while a small proportion of total farm land is available to large proportion of small and marginal peasants. To measure inequality in land distribution, Gini coefficient may be an appropriate tool. Gini coefficient as a measure of inequality ranges between 0 (perfect equality) and 1 (perfect inequality). Lorenz curve provides a graphical depiction corresponding to the Gini coefficient (Todaro 2000), greater the level of inequality, greater will be the distance between Lorenz curve and 45 degree line. So the Gini Coefficient can be defined as ratio of the area between diagonal and Lorenz curve divided by the total area of triangle under the diagonal. A simple statistical indicator of variation in income (land) inequality is the

coefficient of variation of income (size of land holdings). More precisely, it is the ratio of per capita income (farm size holding) to total population (total cultivated land). Inequality can be demonstrated by Lorenz curve. Another measure of inequality is the Theil's entropy index, it varies from 0 (perfect equality) to lnN (perfect inequality) (Thiel 1987). Gini Coefficient is the measure of concentration of agriculture holdings and varies from 0, when all farm size holdings are of same size (perfect equality), to 1, when all land holding belongs to one and rest of the population holdings are zero (perfect inequality (FAO Various Edition cited in Vollrath 2004). Gini coefficient values are higher for the Latin America where it is 0.81 and it is lower in the Sub-Saharan African region where it is 0.49. Lowest value of the Gini coefficient 0.16 was observed for Sweden in 1971 where land distribution is more equitable. In contrast, on the other hand it was observed 0.98 for Hungry in 1980 where very high inequal land distribution prevails (Vollrath 2007). Following the Deininger and Squire (1998) approach, Gini coefficient has been calculated to measure the inequality in the distribution of land in the Punjab, Pakistan.

1 Measuring Land Distribution

Gini Coefficient for distribution of land among various holdings is estimated by following Dininger and Squire (1998) approach. They used the data obtained from decennial agriculture censuses from Food and Agriculture Organization (Various Editions). Based on that data of the total number of holdings and total area of holdings for various farm size categories a Lorenz Curve was drawn that helped in estimating the Gini coefficient. WPH calculated by dividing the total agriculture population by the total agriculture holdings. WPH captures the distribution of the holdings across the population (Erickson and Vollrtah, 2004). Both the measurements affect output independently argued by Vollrath (2004).

Although there are certain limitations of the Gini coefficient even then this approach is preferred over the WPH as it measures operational holdings distribution very distinctly (Vollrath 2007). Results for the WPH are more useful in across country analysis but the Gini coefficient could be a better measure for inequality in land holdings within a country (Vollrath 2004). Gini coefficient for the land holdings captures the efficiency of agriculture sector as it takes into account the number of

holdings and the area of holdings. On the other hand WPH approach addresses the equity in the agriculture sector capturing the distribution of land holdings only within the country (Vollrath 2007). One of the limitations of the Gini coefficient is that it cannot distinguish among the difference in the scales of land holdings across the country. Gini coefficient measures the inequality within the landholders and WPH measures the inequality among the agriculture population (Erickson and Vollath 2004).

In this study, Dinninger and Squire Approach (1998) will be followed and Gini coefficient will be calculated by using data from Agriculture Census (1980), (1990), and (2000). As land is the factor input beyond control of the farmers and conditioned by institutional frame work, it is necessary to include the other variables in the model to specify the impact on agriculture output fully described by Salam (1976). These inputs can vary in a short period of time unlike land as expansion of available land is an uphill task and only possible way to increase the agriculture output is the improvement of the input supply, cropping pattern, and more intensive use of land (Khan (1997) Ahmad (2001), Ahmad and Qureshi (1999) Ahamd *et al (*2003), Adika (2008), and many others).

Data and Empirical Model

To measure the inequality in land distribution data compiled for 34 districts of Punjab, Pakistan, for a period of 28 years from 1982 to 2009.

Gini Coefficient

The study follows Dinniger and Squire (1998) approach to estimate the Gini coefficient. We have calculated Gini coefficients on the distribution of land for various districts of the Punjab province. Data used in these calculations were obtained from the decennial Census of Agriculture of Pakistan (1980, 1990, and 2000). Study made use of the data on total area falling in various farm size categories of each district of the province in these calculations.

Data Limitations

Only three values of Gini Coefficient and average farm size are available as Census of Agriculture is available at three points of time—1980, 1990 and 2000. Vollrath (2007) argued that the data on total area of land holdings and total number of land holdings is very much invariant over time so

the manipulation of any type supposed not to produce any serious problem.

Empirical Analysis and Results

This chapter discusses the Gini Coefficient to measure inequality in land holdings.

6.1 Gini Coefficient

Data on distribution of land among various farm holdings are available from three Censuses of Agriculture conducted in 1980, 1990 and 2000. Accordingly, based on these data sets Gini coefficients were computed at three points of time. Following Dininger and Squire (1998), we have extrapolated the Gini coefficients for the intervening years between the Censuses.

A district-wise analysis of distribution of land among various operational holdings was carried out by using total number of farm holdings and total area of farm holdings broken down into different size of holdings. Gini coefficients are comparable across districts as the categories of size of land holdings were the same across districts (Vollrath, 2007). A meticulous analysis of the available data set at three points of time provides a detailed insight of the structural changes that have occurred over time regarding size of land holdings. Gini coefficient is the measure of efficiency of farm size holdings as it takes into account the distribution of land holdings not the distribution of ownership of land holdings (Vollrath, 2007). To see the impact of land inequality on agricultural productivity both average farm size and land holding Gini have been used in the model.

Table 6.1 shows the Gini coefficients for 34 districts of Punjab Province. Only one observation was available for five districts namely Mandi Bahudin, Hafizabad, Narowal, Lodhran, and Pakpatn. The study however does not omit these districts from the empirical analysis as the missing effect of these districts is being captured by their mother districts from which these have been separated (Ahmad, 2001). Table 6.1 also shows the Gini coefficients for the overall Pakistan and the Punjab Province. Land distribution at the national level is highly skewed and uneven as the value of Gini coefficient estimated at 0.57 for 2000 was pretty high; it was 0.59 for 1990 and 0.52 for 1980 Census years. These results are consistent with the study conducted by Mahmood (1993). In case of Punjab

province the values of Gini coefficients for the Census years of 2000, 1990 and 1980 are 0.53, 0.48 and 0.53, respectively. These varying patterns of land distribution in the Punjab and at the national level need to be examined in detail preferably on the basis of disaggregated data on ownership of land in Punjab and Pakistan.

One of the possible reasons for this inequality is the overtime changes in the land tenure system (Gill and Sampath, 1992; Moazzam, 1993). In 1972, inequality in farm area declined as a result of land reforms of 1960s. But this reduction was fictitious as landed class transferred some of the the tracts to their own family members. So the land concentration increased in 1980s as a reversal of land reforms of 1960s because of the three reasons: firstly, the green revolution that made self-cultivation more beneficial—the tenants were removed by the land lords; secondly, there was forced ejection of beneficiaries, if existed any, of the 1960s land reforms, while some sold out their tracts; and thirdly, readjustment of land ownerships again "after the dust of land reforms had settled" by the landed class (Gill and Sampath, 1992).

The magnitudes of the Gini coefficients show that Faisalabad district has the lowest value of 0.37 in 1980 indicating relatively more equitable distribution of land among the districts. The highest value of Gini coefficient, 0.56, is for the year 1980 for Lahore district reflecting highly skewed distribution of land among all the district.

From the 1990 Census data the lowest value of Gini coefficient, 0.41, was estimated for Toba Tek Singh district and the highest value of 0.61was estimated for the Muzzafargarh district. Based on the 2000 Census data Faisalabad had the lowest Gini coefficient of 0.40 while Muzaffargarh with a Gini coefficient of 0.63 stood at the top showing highest inequality in distribution of land. In some of the districts Gini coefficient has shown abnormal trends. In Attock, Gini coefficient increased at a higher rate—from 0.48 in 1980 to 0.51 in 1990 and 0.56 in 2000, showing a more concentrated land distribution in the district. Land distribution has shown a consistent trend during the period of 1980 to 1990 as shown by the Gini coefficient 0.56 in 1980 and 0.55 in 1990 but land distribution has reduced by almost 11 points i.e. 0.44 in 2000, in case of Lahore district. In some of the districts land

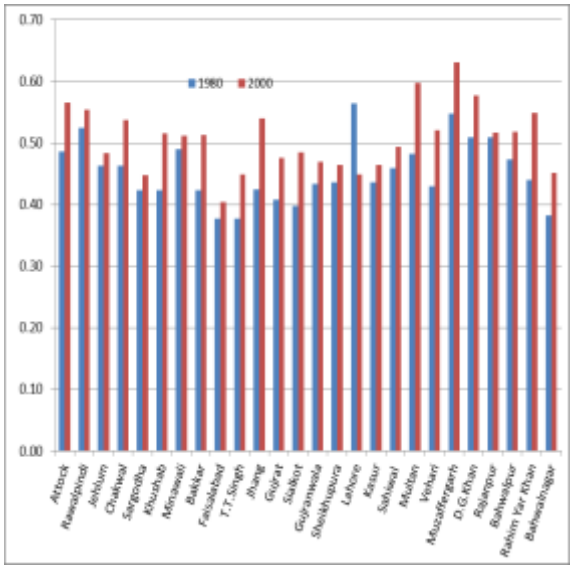
distribution had become more concentrated over the years like in Bahwalnagar, Gujrat, Jhang, Multan, Muzaffergrah, Sialkot, Rahim Yar Khan, and Vehari. For some of the districts, Gini coefficient has increased in 1990 as compared to 1980 but observed decline in the next decade of 1990s. Faisalabad, Gujranwala, Jehlum, and Kasur districts also experienced similar trend. Figure 6.1 clearly indicates that inequality has increased in almost all districts of Punjab, except in Lahore.

Table6.1 District-wise Gini Coefficients

	1980	**1990**	**2000**
Attock	0.4864	0.51630	0.564843
Rawalpindi	0.52429	0.51869	0.553432
Jehlum	0.46311	0.54084	0.483144
Chakwal		0.45015	0.537587
Sargodha	0.42363	0.42673	0.448014
Khushab		0.46248	0.515481
Minawali	0.48957	0.45288	0.511319
Bakkar		0.51537	0.512558
Faisalabad	0.37673	0.42814	0.404146
T.T.Singh		0.41262	0.448851
Jhang	0.42432	0.46101	0.540121
Gujrat	0.40843	0.45421	0.476228
Sialkot	0.39729	0.46450	0.484568
Gujranwala	0.43331	0.49127	0.468813
Narowal			0.468179
M.B.Din			0.414084
Hafizabad			0.460681
Sheikhupura	0.43567	0.46328	0.464211

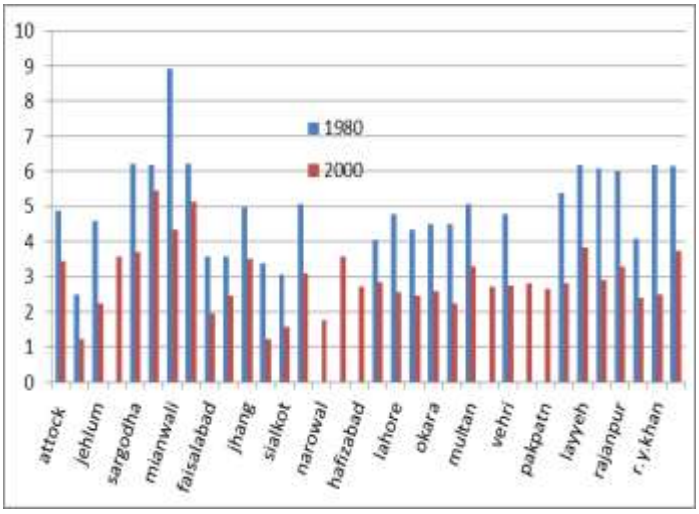
Lahore	0.56386	0.55312	0.44884
Kasur	0.43595	0.47114	0.463755
Okara		0.52068	0.480311
Sahiwal	0.45930	0.49913	0.493635
Multan	0.48224	0.58443	0.597712
Khanewal		0.48259	0.489898
Vehari	0.42953	0.49946	0.520311
Lodhran			0.525618
Pakpatn			0.491241
Muzaffergarh	0.54749	0.61822	0.630681
Layyah		0.46693	0.486958
D.G.Khan	0.50896	0.62875	0.577428
Rajanpur		0.54792	0.516818
Bahwalpur	0.47290	0.52143	0.518231
Rahim Yar Khan	0.44000	0.53195	0.548684
Bahwalnagar	0.38192	0.44713	0.451619
PUNJAB	0.52525	0.48126	0.531079
PAKISTAN	0.51952	0.58789	0.574083

Figure 6.1 Diagrammatical Expositions of Gini Coefficients in 1980 and in 2000



One of the limitations of the Gini coefficient is its failure in addressing the issue of economies of scale in cross sectional data. To overcome this limitation an additional variable in the form of average farm size has to be introduced (Vollrath, 2007). Following Vollrath, this variable was added to the model. Relevant statistics on farm size for the districts of Punjab are presented in Table 6.2. Figure 6.2 shows that farm size has significantly declined in all districts of Punjab.

Figure 6.2 Comparison of Farm Size in 1980 and in 2000



Summary, Conclusion and Policy Implications

The debate over the relationship between farm size and agricultural productivity dates back to early 1960s with the publication of seminal article by Sen that used Indian Farm Management Data. After the publication of this paper various studies have been published on the issue using data from different countries and applying various methodologies. Therefore, there is no dearth of literature on the subject analyzing the data from the subcontinent. However, the previous empirical work failed to accommodate farm size and land distribution inequality both in the models to see the direct impact of the latter on agricultural productivity. Vollrath (2007) however is the exception that used cross-country aggregate data and found that the low productivity is associated with the inequality of operational land holdings.

The present research has filled this gap by estimating the inequality of land distribution at a more disaggregated level as well as the size of the farm. Following Vollrath (2007) methodology, this study used district level data from Punjab province of Pakistan. The reasons of testing Vollrath (2007) hypothesis in Punjab are that this is the major food and fiber producing province in the country and

more importantly the data is easily accessible. The present study has used districts level data from Punjab for the period of 1982 to 2009. To measure the inequality in land distribution, Gini coefficients at the district level have been estimated and found that land inequality has increased overtime almost in all the districts. As a consequence, the fruits of agricultural development are rather shared more unequally (Ahmad and Farooq, 2010). The poor small farmers under use various inputs by 30% to 50% than that of the use by the large rich farmers—further reducing the land productivity (Ahmad, 2003).

The results imply that there is need to address the issue of lower agricultural productivity in the wider perspective to ensure food security, reduce rural poverty, and income inequality. In Pakistan, agriculture sector is the sole provider of food security, employment to a large chunk of labor force, and raw material for the industrial sector. The country is experiencing structural transformations—the share of agriculture in national GDP is declining faster than the share of labour involved in this sector, and a majority of the farmers are poor and work in a low-input and low-output scenario, while only a small percentage of farmers modernizing but at a faster pace (Ahmad and Farooq, 2010). This polarization and a bimodal agrarian structure further deteriorating the disparity between large and small farmers (Ahmad and Farooq, 2010).

What needs to be done is to exercise various options. Imperfections in the land markets that failed to distribute land in a more equitable way need to be reduced. Land reform to redistribute the land assets to landless and marginal farmers is another important policy option that seems to be not practicable while looking at the historical experience in Pakistan. Therefore, there is need to facilitate the development of strong linkages between farm and non-farm sectors, and reduce polarization in the rural economy—either by helping the resource poor farmers to realize greater productivity potential or finding them alternative livelihood opportunities in the non-farm sector through tenure reforms, education, health care, and microcredit. More importantly, the provision of modern technologies—seed, mechanical equipment, balanced chemical fertilizers, to the small and resource poor farmers could result into higher agricultural productivity.

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