PRINT: ISSN 0970-9274 ONLINE: ISSN 2456-6608
J Hum Ecol, 44(1): 39-43 (2013)
DOI: 10.31901/24566608.2013/44.1.05

A Sub-group Decomposition of Land Inequality in the Limpopo River Basin of South Africa

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KEYWORDS Land Fertility. Inequality. Land Ownership. Sub-group Decomposition. Land Reform

ABSTRACT Land inequality in South Africa is a problem that is deeply rooted in land use policy of the dethroned apartheid government. Although land reform is advocated as a means for rectifying the havocs of the past and ensuring that economic development process that favours the poorest segments of the population is set in motion, government has faced a lot of difficulties in its implementation. This study therefore analyzed the degree of inequality in the Limpopo River Basin. The data were collected by the International Food Policy Research Institute (IFPRI) and the Centre for Environmental Economics and Policy in Africa (CEEPA) in 2005. Data analysis was implemented with descriptive statistics and Gini sub-group inequality decomposition. Results show that land inequality was high with over all Gini being 0.9212. Also, inequality between the groups accounted for the highest share of total Gini. It was recommended that efforts at ensuring equity in land ownership should be speeded up with due consideration of inequality across the districts.

INTRODUCTION

The constitutional mandate for correcting the injustices invoked by the South Africa's 1913 Land Act by ensuring equitable land distribution had been clearly spelt in the Act No. 108 of 1996. This is well understood by all citizens because issues of land are very sensitive in the socio-economic development and political agendas of South African government. No doubt, agitations of many South Africans during apartheid era were largely bordered on forceful and illegal dispossession of land. It is already indicated in the land reform policy that restitution of illegally possessed land to initial owners and redistribution of land to landless citizens are paramount policy agendas which have been tenaciously pursued by the government. Also, land reform has been seen as a means for having a development process that can favour the poorest segments of the population.

The prospects of economic liberalization among poor South Africans greatly lie in securing adequate access to production resources. This cannot be over-emphasized for Africa as a whole, where 33 of 48 underdeveloped countries are found, making achievement of reducing poverty by halve in 2015 a mere dream (Wongibe 2002). Furthermore, high concentration of poverty in South Africa's rural areas portends a state of development policy that still engenders unfair treatments and marginalization of the past. If pursued with deserved seriousness, land reform can propel a national democratic revolution for ensuring that the poorest among the poor benefit substantially from economic development and growth processes (Walker 2000).

Inequality in access to land is unimaginably high in South Africa. It should be noted that while 86 percent of the country's agricultural land belongs to some 60,000 commercial farmers, poor smallholders control less than 13 per cent (Wongibe 2002; African Development Bank 2013). Therefore, redistribution of land goes beyond a democratic struggle, it is a resolute fight for the future of millions of unborn black South Africans, and a transformation of the colonial class that has long been rooted in capitalist development and national oppression of the poor (Walker 2000). Suffice it to emphasize that while inequality in land ownership between white and black races is high, intra-racial inequality can as well be tremendously high. This may result from landlessness of many, while some had acquired large tracts of land by transfer through inheritance. It is therefore worthwhile to have an assessment of the nature of intra-race land ownership inequality, given that conventional wisdom has denoted the enormity of inter-racial land ownership inequality (Ashton 2013).

There are many socio-economic issues that can engender intra-racial land ownership inequality even after implementing land reforms policies. This is motivated by the fact land is a

property for which the owners have some rights to use in a manner that maximizes expected utility.This implies that even if land areas are returned to previous owners,the policy of "willing seller and willing buyer" can further promote inequality. This keenly lies on the nature of economic destitution that may make reclaimed lands to be productively redundant in the hands of new owners. It had also been noted that currently, most of the redistributed farms are financially bankrupt, bedeviled by inadequate infrastructure, among others. In the face of numerous production bottlenecks, reclaimed land may be sold thereby returning the initial status quo, though initially aggrieved party may have been financially settled. In such a case, would government have achieved the objective of land reforms which solely dwells on long-run human capacity development for permanent exit from the web of chronic poverty? We may also ask if new owners will possess the needed competence for using the land for food production in order to averse food crisis and malnutrition? Government and other stakeholders involved have got to tactically address these issues and lots more in their effort towards ensuring land redistribution in South Africa.

In the Limpopo River Basin, access to land defines the types of crop that can be grown and other enterprise combinations. In absence of sufficient land, production decisions are confronted with serious obstacles. This study seeks to provide an assessment of land ownership pattern and its inequality decomposition in the Limpopo River Basin. The remaining parts of the paper are divided into materials and methods, results and discussions and conclusion.

MATERIAL AND METHODS

Sources of Data and Sampling Methods

The data used in this study were collected by the International Food Policy Research Institute (IFPRI) and the Centre for Environmental Economics and Policy in Africa (CEEPA). Based on some met criteria, permission to download the data was granted by IFPRI. The multi-stage sampling method was used to select 794 households that were interviewed, although the initial target was 800 households. The data were collected from 20 districts in the South Africa's Limpopo River Basin. The districts were selected to reflect key Water Management Areas (WMAs) and agricultural production activities. At the first stage, total number of sample districts was identified. At the second step, 20 districts were selected out of the 5 WMAs. The third step involved determining the distribution of the 20 districts across the 4 provinces in the basin. The Gauteng (2), Limpopo (9), Mpumalanga (6) and North West (3) were selected. The fourth step involved random sampling of farm households that undertook some farming activities during the April 2004 to May 2005 farming season. The survey was carried out between August and November 2005.

Data Analytical Approach

This paper used the traditional Gini coefficient decomposition proposed by Silber (1989) and Lambert and Aronson (1993) which had been widely applied in economic literature. Griffiths (2008) submitted that this decomposition approach is completely similar to that proposed by Dagum (1997). Suppose there are *k* sub-groups that make up the total population of a district, region or province, a decomposition framework for determining the contribution of each sub-group to total inequality can be specified. Let μ_i denote the mean land for the *i*-th sub-group and γ_i is the population share of the *i*-th sub-group. Then, the mean land for the district is $\mu = \sum_{i=1}^{k} \gamma_i \mu_i$ and the land share for ith sub-group can be expressed as $s_i = \gamma_i \mu_i / \mu$. The decomposition begins by specifying an expression for Gini coefficient which is:

$$G = G_w + G_B + G_R \quad (1)$$

Where G_w is the within-group inequality, G_B is the between-group inequality and G_R is a residual which is positive when some of the sub-population land distributionsoverlap. The contribution ofa sub-group to inequality is given by weighted average of the Gini coefficients for each of the sub-groups, with weights given by the products of the population and land shares. Therefore,

$$G_w = \sum_{i=1}^{k} \gamma_i \mu_i G_i \quad (2)$$

Where G_i is the Gini coefficient of ith sub-group.

Between district inequality G_B is the Gini coefficient that would be obtained if everybody in a given sub-group was given the mean land for

that group. In order to define G_B, we need to define y_{ih} as the land of the *h-th* sub-group. Let n_i be the number land units in ith sub-group and $n = \sum_{i=1}^{k} n_i$ is the number of land units in the sub-group. The Gini for the sub-group is expressed as:

$$G = \frac{1}{2n^2\mu}\sum_{i=1}^{k}\sum_{j=1}^{k}\sum_{h=1}^{n_i}\sum_{k=1}^{n_j}|y_{ih} - y_{jk}| \quad 3$$

if y_{ih} and y_{jk} are replaced with their sub-group means n_i and n_i respectively, then

$$G = \frac{1}{2n^2\mu}\sum_{i=1}^{k}\sum_{j=1}^{k}\sum_{h=1}^{n_i}\sum_{k=1}^{n_j}|\mu_i - \mu_j| - \frac{1}{2n^2\mu}\sum_{i=1}^{k}\sum_{j=1}^{k} n_i n_j |\mu_i - \mu_j| \quad 4$$

RESULTS AND DISCUSSION

Description of Land Ownership

Table 1 shows the pattern of land ownership. It shows that the lowest proportion (2.39 percent) of the respondents borrowed the land they were using, while the highest proportion (37.41 percent) was on communal land. This finding shows that majority of the farmers were having the livestock ortheir farms on communal lands. Also, 24.69 percent of the respondents indicated to own their lands, but 8.44 percent rented the land. Also, 2.39 percent were on sharecropping. These findings are clearly pointing towards the fact that majority of the farmers were not personally owning land. In addition, average total land owned is 106.45 hectares with standard deviation of 524.68. Communal land has a mean of 101.66 with standard deviation of 576.31. Land areas that were personally owned by the farmers have mean of 190.90 with standard deviation of 710.67. The high standard deviation in all the land ownership groups suggests very high variability. Average total land owned is 106.45 with standard deviation of 524.69. This clearly shows very high dispersion in the distribution.

Table 2 shows the distribution of across the districts. It shows that average land owned by farmers from Warmbad is highest with a mean of 329.34 hectares and standard deviation of 1226.10. This is followed by farmers from Nebo with average land ownership of 250.70 hectares and standard deviation of 406.89. Other districts with high average land ownership are Middleburg (237.28 hectares), Witrivier (188.68 hectares) and Thohoyandou (155.88 hectare).The table also reveals that districts with lowest average land areas are Brits (6.08 hectares), Cullinan (11.40 hectares), Tzaneen (12.47 hectares), Messina (25.47 hectares), Krugersdorp (25.50 hectares) and Thabazimbi (27.04 hectares). Table 2 further shows the land share of each of the districts. It reveals that Middleburg has the highest share of the total land areas with 14.32 percent. This are closely followed by Warmbard, Nebo and Witrivier with 12.47 percent, 11.86 percent and 11.61 percent. Districts with lowest land share are Brits, Krugersdorp and Tzaneen with

Table 1: Land ownership patterns in the Limpopo River Basin of South Africa

Land Group	*Freq*	*% total*	*Mean*	*Standard dev*
Borrowed	19	2.39	164.18	391.41
Communal	297	37.41	101.66	576.31
Others	196	24.69	32.44	239.64
Owned the land	196	24.69	190.90	710.68
Rent	67	8.44	68.80	158.09
Sharecrop	19	2.39	148.63	423.76
Total	794	100.00	106.45	524.69

Source: Field Survey 2005

Table 2: Land ownership across the selected districts of the Limpopo River Basin of South Africa

District	*Frequency*	*Average (ha)*	*Standard deviation*	*Share of total land area*
Brankhortspruit	30	89.70	172.36	3.18
Brits	26	6.08	13.43	0.19
Carolina	34	44.50	153.73	1.79
Cullinan	5	11.40	8.20	0.07
Krugersdorp	14	25.50	21.81	0.42
Lephalele	63	16.79	63.77	1.25
Lydenburg	36	109.28	338.55	4.65
Makpopane	55	58.76	403.97	3.82
Marico	51	91.00	423.15	5.49
Messina	49	25.47	76.48	1.48
Middelburg	51	237.28	1144.23	14.32
Nebo	40	250.70	406.89	11.86
Nkomazi	30	96.45	374.33	3.42
Rustenburg	33	112.40	403.54	4.39
Soutpansberg	66	107.16	391.27	8.37
Thabazimbi	30	27.04	109.68	0.96
Thohoyandou	52	155.88	841.49	9.59
Tzaneen	45	12.47	20.87	0.66
Warmbad	32	329.34	1226.10	12.47
Witrivier	52	188.68	528.55	11.61
Total	794	106.45	524.68	

Source: Field Survey 2005

Table 3: Source Gini and between/within inequality in the districts in Limpopo River Basin

Group #	*Estimated S-Gini*	*Population Share*	*Land Share*	*Absolute Contribution*	*Relative Contribution*
Brankhortspruit	0.7243	0.0378	0.0318	0.0008	0.0009
Brits	0.7575	0.0327	0.0019	4.637E-05	5.018E-05
Carolina	0.8349	0.0428	0.0179	0.0006	0.0007
Cullinan	0.3298	0.0063	0.0007	0.0000014	1.52E-06
Krugersdorp	0.4596	0.0176	0.0042	3.423E-05	3.704E-05
Lephalele	0.8286	0.0793	0.0125	0.0008	0.0009
Lydenburg	0.8459	0.0453	0.0465	0.0018	0.0019
Makpopane	0.9470	0.0693	0.0382	0.0025	0.0027
Marico	0.9055	0.0642	0.0549	0.0031	0.0035
Messina	0.7905	0.0617	0.0147	0.0007	0.0008
Middelburg	0.9377	0.0642	0.1432	0.0086	0.0093
Nebo	0.7420	0.0504	0.1186	0.0044	0.0048
Nkomazi	0.9338	0.0378	0.0342	0.0012	0.0013
Rustenburg	0.9200	0.0416	0.0439	0.0017	0.0018
Soutpansberg	0.8701	0.0831	0.0837	0.0061	0.0065
Thabazimbi	0.8761	0.0378	0.0096	0.0003	0.0003
Thohoyandou	0.9444	0.0655	0.0959	0.0059	0.0064
Tzaneen	0.6155	0.0567	0.0066	0.0002	0.0003
Warmbad	0.9235	0.0403	0.1247	0.0046	0.0050
Witrivier	0.8869	0.0655	0.1161	0.0067	0.0073
Within-Group	-	-	-	0.0505	0.0546
Between-Group	-	-	-	0.4408	0.4769
Overlap	-	-	-	0.4329	0.4684

Source: Field Survey 2005

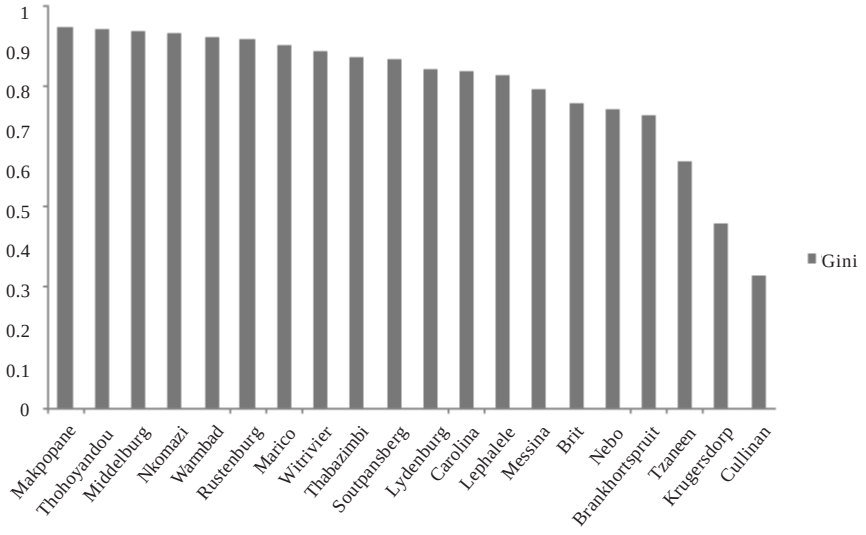

Fig. 1. Distribution of land inequality Gini coefficients in Limpopo River Basin of South Africa

0.91 percent, 0.42 percent and 0.66 percent, respectively.

Table 3 shows the computed Gini-coefficients of the land areas across the different districts. It shows that inequality in land ownership is highest in Makpopane and Thohoyandou with Gini indices of 0.9470 and 0.9444 respectively.Other districts with very high land inequality are Middelburg, Nkomazi and Lydenberg with Gini coefficients of 0.9377, 0.9338 and 0.8459, respective-

ly. The Gini coefficients are also represented in Figure 1 which arranges them in decreasing order. The districts with lowest land inequality Ginis are Cullinan, Krugersdorp and Tzaneen with Gini indices of 0.3298, 0.4596 and 0.6155, respectively. The table also shows that the between-group inequality accounted for 47.69 percent of the total land inequality, while overlap of the between- and within- group inequality accounts for 46.84 percent. Within group inequality accounts for just 5.46 percent of the total inequality. In actual fact, the result shows that inequality between the groups is the main underlying factors for the observed land inequality. This is very critical because it portrays the wide land inequality between the groups. The results further show that if inequality within the groups are totally addressed, overall land inequality would be very low. The impact of inequality overlap reveals substantial amount and shows that sub-population land distribution overlapped in many districts.

CONCLUSION

The results have shown the extent of land inequality in the Limpopo River Basin. There are empirical facts to support the much debated problem of skewed land distribution in South Africa as a whole. This paper has distinctively shown that the Gini coefficients of land ownership are very high, with the between group inequality accounting for the highest contribution to inequality. There is therefore the need for rapid implementation of the land reform in order to address the much debated problem of land inequality. This is fundamental for giving hope to the black race that had suffered from serious deprivation and marginalization in their own fathers' lands.

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