Efficiency and Equity Impacts of Informal Land Rental Market Participation Among A1 and A2 Farmers in Mashonaland East Province of Zimbabwe

Abstract

Agriculture, and consequently land is considered a potential to increase economic growth and development than any other sector. With a lot of studies in Asian economies showing increased efficiency and equity associated with land rental markets, this study sought to establish if the same was true for informal land market in one province of Zimbabwe. The study was carried out through a survey consisting of 339 households identified through multi-stage sampling procedure. Results showed that farmers renting-in land had higher levels of input use, production and revenues, followed by those renting-out and land rental non-participating farmers (autarky) being the last. Economic efficiency was just above average for all farmer categories, implying land markets alone may not be a panacea to efficiency improvements. There was a marginal improvement in efficiency for land rental market participants when compared with those in autarky. Access to credit, farming experience, crop type, area and labour were the major drivers of inefficiency across all farmer categories. Equity improved marginally across districts, gender and A2 farmers due to participation in land rental markets, though land concentration is evident among A1 farmers. Land rental markets improve equity and efficiency though cannot be solely relied upon.

Key words: land rental markets; efficiency; equity; A1 and A2 farmers; Zimbabwe

1. Introduction and Background

Land, along with capital are recognised as major factors of production needed for economic growth and development (Tadessea et al, 2016). Market economies, with a focus on protection of private property, have leaned towards private tenure systems for land (Norton, 2004) to ensure efficient utilisation of land. However, even in developing countries, where lease and customary tenure systems are dominant, the focus has been on addressing equity, poverty alleviation, economic efficiency, as well as environmental and institutional sustainability (Zikhali, 2008). Awasthi (2009) suggested that optimum utilization of land can be achieved through a well-developed land market, supported by a conducive land policy. This environment ensures optimum utilization of land, facilitating transfer of land from less productive to more productive producers. Deininger et al (2008) urged that restrictions on land rentals have the effects associated with large efficiency losses by excluding efficiency-enhancing transfers of land and diversification of rural income sources. This was evidenced by studies in India where rental markets decreased from 26% in 1971 to 11% in 2001 due to high land rentals transaction costs. In contrast, China and Vetnam rental market increased and this had a ripple effect on productivity. There is a global consternation that land rental markets and leasing arrangements might lead to re-concentration of land and invalidate the equity gains made when initial distribution of land were made. While acknowledging that evidence to this extent is mixed and limited (Vranken and Swinnen, 2006); Jin and Deininger (2009) pointed out that in environments characterized by asymmetric access to information, capital, and legal means of enforcement, such as Zimbabwe, re-concentration of land that repudiates equity gains may be a realistic outcome, an argument also put forward by Moyo and Yeros (2004). However, in developing and transitional economies, which are characterised by tenure insecurity and market imperfection, rental markets often have

better allocative efficiency and equity outcomes and play important roles than sale markets (Jin and Deininger, 2009).

Zimbabwe undertook massive land reforms, often referred as the Fast Track Land Reform Programme (FTLRP), starting in 2000, which resulted in enormous changes in the structure of land ownership in the agricultural sector (Moyo and Chambati, 2013). Farming area for white owned large-scale commercial sector was reduced by 38.6%, while an increase in hectarage for both A1 (17.5%) and combined A2 (10.7%) was observed under the FTLRP. Currently, 10.8% of farmers are now from the A1 model and 1.7% is from A2 model. The number of white large-scale farmers reduced from about 5 400 in 1980 to about 200 in 2010 (Moyo and Chambati, 2013).

Over the same period of the FTLRP, production of most commodities plummeted to record lows, with tobacco, beef, horticulture and wheat all showing negative trajectories. Tobacco for example declined from above 200 million kg in 2000 to an all-time low of 45 million kg in 2006 and bouncing back to above 100 million kg in 2010 while wheat declined from 230 million kg in 2000 to 18 million kg in 2010 (Moyo and Chambati, 2013). The policy requirement that A1 farmers must pay $15 per farm and A2 pay $5 per hectare annually (Finance Act, 2016) also worsened farmers' predicament as most of them were not engaging in productive farm activities. Many resettled farmers who were not utilising or were underutilising allocated land resorted to renting out the land to either neighbouring farmers or individuals without land but with capabilities to produce. Among the latter category were white former commercial farmers who negotiated privately for rentals with resettled farmers. This led to prevalence of informal land rental agreements, aided by policy inconsistencies as to whether land renting was legal or not. This study was therefore aimed at analysing efficiency and equity impacts associated with participation in informal land rental markets.

2. Methodology

The study was conducted in Mashonaland East Province and a sample of 339 households was obtained based on probabilistic sampling. Multistage sampling was used to select the final respondents for interviewing. Following the work of Awasthi (2009) and Mushunje et al (2003), a rental market participation and modified Cobb-Douglas production function was specified to measure efficiency. The general model for this study relating production, Y, to a given set of resources X, and other conditioning factors is given as follows:

$$Y = b_0 X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} \quad [2]$$

Where b_0 is a constant and b_1, b_2, b_3, b_4, b_5, and b_6, are elasticities to be estimated. To use the least squares method for estimating the parameters, the model is linearized to the following specification:

$$\ln Y_i = b_{0i} + b_{1i} \ln X_1 i + b_{1i} \ln X_{2i} + b_{3i} \ln X_{3i} + b_{4i} \ln X_{4i} + b_{5i} \ln X_{5i} + b_{6i} \ln X^2_{6i} + b_{7i} \ln X_{7i} + b_{8i} \ln X_{8i} + V_i - U_i \quad [3]$$

Where the subscript i indicates the i-th farmer in the sample (i=1,2, 3……n):
Y = gross agricultural output value

X_1= total expenditures on crop production i.e. seed, inorganic fertilizers, herbicides and pesticides, animal and mechanical traction, and soil quality
X_2= total area cultivated (ha)
X_3= total labour days
X_4= total area on crop production
X_5= total value of agricultural assets
X_6= household head age
X_7= share of irrigated area (ha)
X_8= number of years of education for household head
X_9= access to credit

Economic, technical, and allocative efficiency were measured for farmers participating in land rental markets and compared to those not participating in the markets. Also, the drivers of inefficiency were determined from the above model for different categories of farmers.

The equity hypothesis was examined by evaluating the distribution of arable area owned and actual operated land. It was assumed that promotion of equity in the rental market is achieved if the distribution of actual operated land is more equitable than that of own arable land. The Gini coefficients were computed and compared for both land owned and operated land. The Gini coefficients were calculated using the standard method as given below (Tian et al, 2012):

$$G = 1 + \frac{1}{n} - \frac{2(Y_1 + 2Y_2 + 3Y_3 + \cdots + nY_n)}{n^2 Y_0} \quad [4]$$

Where n is the number of households, Y_n represents land holdings per capita in each household, for households 1 through n, and Y_0 is the average number of land holdings per capita in each household.

3. Results and Discussion

3.1 Impact of Land Rental Market Participation on Farmer Efficiency

Table 1 shows the efficiency indicators obtained from the model.

Table 1: Efficiency Indicators for Selected Categories of Farmers

Settlement type	Farmer category	Technical efficiency	Allocative efficiency	Economic efficiency
A1 model	Autarky	0.734 (0.014)	0.769 (0.010)	0.565 (0.010)
	Renting-in	0.748 (0.020)	0.774 (0.014)	0.579 (0.015)
	Renting-out	0.759 (0.018)	0.779 (0.016)	0.592 (0.182)
A2 model	Autarky	0.764 (0.029)	0.782 (0.029)	0.598 (0.301)

Settlement type	Farmer category	Technical efficiency	Allocative efficiency	Economic efficiency
	Renting-in	0.786 (0.045)	0.802 (0.301)	0.631 (0.297)
	Renting-out	0.744 (0.029)	0.752 (0.231)	0.560 (0.281)
Overall	Autarky	0.739 (0.013)	0.771 (0.009)	0.570 (0.010)
	Renting-in	0.754 (0.019)	0.779 (0.013)	0.588 (0.013)
	Renting-out	0.755 (0.015)	0.772 (0.013)	0.583 (0.015)
A1 Overall		0.743 (0.01)	0.773 (0.007)	0.575 (0.008)
A2 overall		0.762 (0.019)	0.776 (0.016)	0.592 (0.017)
Sample		0.747 (0.008)	0.773 (0.006)	0.578 (0.007)

*figures in parentheses are standard errors

In general efficiency was average among the sampled farmers, a position supported by Matondi and Dekker (2008) who showed that overall production on resettled land is going down, farmer productivity was low and returns to farming for these farmers were generally on the decline in Zimbabwe. Moyo (2016) showed that both A1 and A2 farmers were to a large extent being involved in maize production, even in agro-ecological regions where other enterprises would give better margins, and this had the effect of reducing efficiency. A comparison between A1 and A2 farmers showed that on average, technical, allocative and economic efficiencies were higher for the later compared to the former. This is largely expected given that A2 farmers were given land on the basis of having adequate capital to undertake the agricultural activities. Essentially, it was expected that A2 farmers had more resources to put into production and better efficiency as a result. It must however be noted that these results did not show significant differences between these two groups of farmers.

Results indicated that in terms of economic efficiency, farmers renting-in land had the highest, followed by those renting-out while farmers in autarky had the least efficiencies. This trend followed the results of Chamberlin and Rickter-Gilbert (2016), who concluded that land rental markets are associated with better efficiencies. For A2 farmers, those farmers renting-in had the highest economic efficiency, followed by those in autarky, with farmers renting-out coming last. While these results maybe inconclusive in terms of inference, overall results according to participation in land rental markets gives a better understanding. These results showed that farmers renting-in were the most efficient, followed by renting-out farmers and farmers in autarky were the last. However, such average levels of efficiency even for farmers renting-in and renting-out suggested that participation

in land rental markets alone cannot significantly improve farm efficiency levels. In terms of technical efficiencies, the same trend was followed as with economic efficiency. Most of the farmers who were renting-in land either did own land or were using all the land they were allocated. In most cases, these farmers were very mobile, had managers overseeing production, leaving them ample time for market research and for the former white farmers, they had a strong network for both input and output markets. It therefore followed that allocative efficiency for this category of farmers was relatively higher compared to the other groups. Similar results were obtained by Akter (2006), who showed that farmers engaging in land rental markets were more efficient than those farmers who were not involved. The same results of increased production due to renting-in were also obtained by Lohmar et al (2001), who reported higher land productivity for farmers involved in tenting-in. Feng (2008) also concluded that farmers participating in land rental markets were more technically efficient in rice production of China compared to those that were not involved in the practice. However, Awasthi (2009) differed with results showing that there was no statistically significant difference in efficiency among different land rental arrangements.

In order to understand the possible sources of the inefficiencies among different categories of farmers, a Cobb Douglas estimation of elasticities was performed and the results are shown in Table 2.

Table 2: Determinants of Farmer inefficiency

Variables	**Autarky**	**Renting-in**	**Renting-out**
Log_Value_Assets	0.079	-0.059	-0.720
	(0.065)	(0.091)	(1.864)
log_Hhh_Age	0.060*	0.783	0.007**
	(0.562)	(0.943)	(1.067)
Credit	1.731**	0.207*	1.150**
	(2.592)	(0.949)	(1.985)
log_Irrig_share	-0.274	0.879**	-0.287
	(0.443)	(0.380)	(0.433)
Gender_hh	-0.113*	-0.308	-1.239
	(0.438)	(0.870)	(1.467)
Livestock	0.565*	0.118*	0.216***
	(0.693)	(0.540)	(0.672)
log_Irrig	-0.565	-0.832**	-0.588
	(0.693)	(0.343)	(1.014)
Experience	0.292*	0.302**	0.316***
	(0.875)	(0.442)	(2.212)
Married	-0.302	0.375	0.009
	(0.442)	(0.907)	(0.647)
Log_Exp_Crop	0.801***	0.808***	0.692***
	(0.048)	(0.044)	(0.062)
Log_Area_crop_prod	0.575***	0.146**	0.485***
	(0.136)	(0.070)	(0.101)
Log_Labor	0.078*	0.155***	-0.026
	(0.041)	(0.046)	(0.060)

Variables	Autarky	Renting-in	Renting-out
Observations	279 279	134 134	144 144
Mean efficiency	0.570	0.588	0.583
	(0.215)	(0.258)	(0.196)
Wald chi2(3)	541.34***	1160.56***	288.84***
Prob > chi2	0.000	0.000	0.000

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; in parenthesis are standard errors except for Mean efficiency with Standard deviations for mean efficiency in parenthesis

Results showed that determinants of inefficiency for farmers not involved in rental markets were age, access to credit, gender, livestock assets, experience, the type of crop, area under crop production and labour. For the farmers involved in renting-in, results show that their sources of inefficiency were credit, proportion and size of irrigation land, livestock assets, experience, chosen crop enterprises, size of those enterprises and labour. In addition to those factors identified for land rental non-participants (autarky), farmers renting-in should also pay attention to irrigable land, as a lot of inefficiencies were coming from this area. Results also showed that determinants of inefficiency among farmers involved in renting-out were age, access to credit, livestock assets, experience, the type of crop and the size of that particular enterprise. Access to credit has a great bearing on improving efficiency for all farmers irrespective of their level of participation in land rental markets. Lack of title to land has made it difficult for resettled farmers to access loans from financial institutions (Moyo and Chambati, 2013). The choice of the enterprises also had a strong bearing on the efficiency. Most resettled farmers are in maize production due to lack of knowledge about potential viable enterprises or an inherited communal tradition of growing maize for food security Moyo (2016). This practice has the effect of reducing efficiency as traditionally agricultural production in the country has been a function of climatic conditions, level of input use as well as prevailing inputs and outputs markets. Results by Pender and Fafchamps (2006) concurred with the results of this study in that policy interventions towards promoting proper functioning of land rental markets might not yield much in terms of economic efficiency of farmers, rather more effort should be put on stabilisation of macro-economic fundamentals, productivity and factor markets improvements in order to improve efficiency of different categories of farmers.

3.2 Land Rental Market Participation and Equity Impacts

Table 3 showed the statistics for land owned and land operated for the different categories of farmers.

Table 3: Descriptive summaries of land owned and land operated

Category	N(number)	Mean land owned (ha)	Mean land operated (ha)
Goromonzi	229	30.18	27.88
Marondera	110	21.43	9.62
A1 farmers	266	4.8	5.12
A2 farmers	73	93.65	83.32
Male-headed	271	22.05	31.37

Female headed	68	31.46	24.32
Overall	339	23.93	21.96

The table showed that for the majority of farmer categories, average land owned is higher than average land operated. This implied that these categories are actually engaging more in renting-out and hence the reduction in usable land. For Goromonzi district, on average there were more farmers involved in renting-out than either autarky or renting-in. The same goes for Marondera, which had a very significant drop in land usage from those who own land. A2 farmers and female headed households also experienced the same drop as did the overall sample. On the other hand, A1 farmers on average had an increase in land usage, meaning more farmers were engaging in renting-in land compared to either renting-out or autarky. Also experiencing the same trajectory are male-headed households. Table 4 shows a comparison of the Gini coefficients of land owned and land operated for the same categories of farmers.

Table 4: Gini coefficients of land owned and land operated

Category	**Gini land owned**	**Gini land operated**
Goromonzi	0.78	0.76
Marondera	0.51	0.48
A1 farmers	0.12	0.24
A2 farmers	0.56	0.56
Male-headed	0.74	0.73
Female headed	0.76	0.74
Overall	0.75	0.74

In general, results showed that inequality in land owned was higher for Goromonzi district, male and female headed households as well as overall sample. Inequality was much lower in Marondera and among A2 farmers. The results implied that whenever farmer categories have A1 and A2 farmers in the same category, inequality tended to be high and this has to be understood from the land holding disparities among these two categories of farmers. Equality was very strong among A1 farmers, as land holding was almost standardised at 6 hectares per household. In general, Model A2 tended to increase disparities (inequality) because of the variability of land holdings compared to A1 farmers, and this in turn caused strong positive Gini coefficient values.

The results are consistent with the findings by Deininger et al (2008) whose conclusion was that land rental markets reduced inequality. For A1 farmers, participation in land rental markets actually increased inequality in land holdings, by more than doubling the Gini coefficient. A possible explanation is that a lot of A1 farmers were renting-out land to the same individuals and this had the effect of concentrating land in the hands of a few farmers, consequently increasing inequality. From the focussed group discussions carried out, farmers indicated that in tobacco producing areas, farmers who tend to rent-in land were mostly the same good farmers and they rent from a number of different land owners. A surprising feature was that there was no change in land holding inequality among A2 farmers. A plausible explanation was that the rate of renting-in was the same as that of renting-out and this exchange was equally distributed. This study mirrors the findings by

Akter (2006) who showed that participation in land rental markets improved equity among villages in India and improved land use distribution.

4. Conclusion

The study was aimed at evaluating the possible impacts of land rental market participation on both efficiency and equity. Most of the farmers were close to average in terms of efficiency. Farmers renting-in land were found to be the most economically efficient, followed by those who were renting-out and last were farmers not participating in land rental markets, though the differences seemed to be marginal. For farmers not participating in rental markets, the sources of inefficiency were access to credit, gender, livestock assets, experience, crop type, crop area and labour. For farmers renting-in, credit, proportion of irrigable land, livestock assets, size of irrigable land, crop type, crop area, farming experience and labour were identified as drivers of inefficiency, while for renting-out farmers; age, access to credit, livestock assets, experience, crop type and associated area were the drivers. Results on equity showed that by participation in land rental markets, inequality was reduced for farmers in the two districts as well as for male and female headed households. Inequality was increased among A1 farmers. Overall the position was that participation in land rental markets resulted in reduced inequality in land holding among the sampled farmers. The study recommends the need for farmers to specialise in particular enterprises that are favourable to respective natural regions and also build on economies of scale.

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