Livelihoods after Land Reform in Zimbabwe

Working Paper 7

Fast Track Land Reform Programme, Tenure Security and Agricultural Productivity in Zimbabwe

Precious Zikhali

Centre for World Food Studies (SOW-VU), VU University Amsterdam

June 2010

Livelihoods after land reform in Zimbabwe Working Paper Series

The land reform that has unfolded in Zimbabwe since 2000 has resulted in a major reconfiguration of land use and economy. Over 7 million hectares of land has been transferred to both small-scale farm units (the A1 model) and larger scale farms (the A2 model). The land reform has had diverse consequences, and there is no single story of what happened and its implications.

The Institute of Development Studies (University of Sussex, UK), the Institute for Poverty, Land and Agrarian Studies (PLAAS, University of the Western Cape, South Africa), the African Institute for Agrarian Studies (AIAS, Harare), the Centre for Applied Social Sciences Trust (CASS Trust, Harare) and the Ruzivo Trust (Harare) came together to support a small grant competition aimed at generating new case study insights based on original and recent field research by young Zimbabwean scholars. The aim was to bring together solid, empirical evidence from recent research in the field. There were over 70 applicants, and 15 small grants were offered. The result is this Working Paper series. All papers have been reviewed and they have been lightly edited. In all cases however they remain work-in-progress.

Today policymakers are grappling with the question of 'what next'? How can a new agrarian structure be supported, and a vibrant rural economy be developed? Yet such discussions are often taking place in a vacuum, with limited empirical data from the ground and overshadowed by misperceptions and inappropriate assumptions. We hope this series – together with the wider research work being undertaken by our organisations and partners – will help to enhance policy making through a solid evidence base.

As these papers clearly show, there have been highly varied impacts of the post-2000 land reform: on rural livelihoods, on agricultural production, on markets and the economy, on farm workers and employment, on the environment and on institutions and governance arrangements, for example. And these impacts have played out in very different ways in different places. These papers cover a range of themes and offer insights from across the country.

They add up to a complex picture, but one that offers key pointers for the way forward. They counter the excessively pessimistic picture often painted about Zimbabwe's land reform, yet highlight important failings and future challenges. We very much hope that they are widely read and shared, with the insights made use of as Zimbabwe charts its way forward.

Professor Ian Scoones, Institute of Development Studies, UK
Professor Ben Cousins, Institute for Poverty Land and Agrarian Studies, South Africa
Professor Sam Moyo, African Institute for Agrarian Studies, Harare
Dr Nelson Marongwe, Centre for Applied Social Sciences Trust, Harare
Dr Prosper Matondi, Ruzivo Trust, Harare

The small grant competition was coordinated through the Livelihoods after Land Reform research programme (www.larl.org.za).

Summary

This paper uses data on beneficiaries of Zimbabwe's Fast Track Land Reform Programme (FTLRP) and a control group of communal farmers, who applied for land under the programme but were rejected, to explore the link between FTLRP beneficiaries' perceptions of land tenure security and agricultural productivity. The main hypothesis of the paper is that the programme created perceptions of tenure insecurities among its beneficiaries which affected farmers' willingness to undertake land-related investments. The resulting reduction in land-related investments is then expected to lead to lower agricultural productivity.

Summary statistics from the data and statistical analysis reveals interesting results. First we find evidence that programme beneficiaries perceive themselves as less land tenure secure compared to their counterparts in the communal areas. Second we find that FTLRP beneficiaries have so far invested less in land-related investments. However contrary to economic theory and existing empirical findings that postulate that less perceived tenure security has a negative impact on productivity negatively (through reduced farm investments), FTLRP beneficiaries are found to be more productive than communal farmers. Econometric analyses reveal that the source of this productivity differential lies in differences in input usage. Specifically FTLRP beneficiaries derive productivity gains from the use of chemical fertiliser and hired labour, while communal farmers enjoy productivity gains from using household labour and soil conservation.

The results are informative to the government of Zimbabwe as it seeks to revive the agriculture sector. First there is need to clarify and formalise land tenure arrangements within the programme. Second as conventional wisdom says: agricultural inputs matter for production. However, the fact that chemical fertiliser contribute to the productivity advantage of FTLRP beneficiaries means that calculating beneficiaries' benefits from FTLRP need to consider costs the government incurs in subsiding fertilisers. This follows from evidence that indicates that the government gives FTLRP beneficiaries preferential treatment when it comes to access to fertilisers.

Contents

Acronyms

FTLRP	Fast Track Land Reform Programme
NEPAD	New Partnership for African Development
OLS	Ordinary Least Squares
PCA	Principal Components Analysis

Introduction

Land reform programmes that redistribute land from large landowners to the landless are often used to achieve egalitarian, political and economic objectives (Ghatak and Roy 2007). The main economic rationale for land reform lies in the inverse-farm productivity relationship, which argues that for given technology levels, small farms are more efficient than large farms due mainly to fewer problems of supervision (Deininger et al. 2002). Equity considerations arise in situations where a significant proportion of the population rely on agriculture for their subsistence while political considerations become pertinent in countries with a history of social injustice or exclusion with regards to land ownership.

The extent to which these objectives are fulfilled depends on how the reforms are implemented and how well they are able to gain the public's confidence. If done in a manner that fails to inspire public confidence in the process, land reforms could create tenure insecurity even among its beneficiaries. Under these circumstances, economic theory predicts that the reforms will be accompanied by reduced agricultural investments and subsequently agricultural production. Here land tenure security is defined as the farmer's perception of their rights to a piece of land free from interference from outsiders, which can be broken down into the perceived right to bequeath, rent out as well as use the land as collateral against a financial loan. This linkage explains the persistent interest in land tenure security as a driver of agricultural production and subsequently poverty reduction in Africa by international organizations such as NEPAD (2003), the Commission for Africa (2005), FAO (2005), and the UN (2004; 2005).

In the case of Zimbabwe, equity and political considerations have been the driving motives for redistributive land reforms. At independence in 1980, Zimbabwe inherited an agricultural sector characterised by duality and a racially skewed land ownership pattern. Zimbabwe's land reform and resettlement programme can be classified into two broad phases. The first stretched from 1980 to 1997 and was based on a willing-seller/willing-buyer approach in line with the government's policy of national reconciliation and the restrictive Lancaster House Constitution.[1] However, in 1997 the government of Zimbabwe initiated a process of radical land reform premised on extensive compulsory land acquisition and redistribution (Moyo 2004). This marked the start of the second phase of the programme. The Fast Track Land Reform Programme (FTLRP), on which our analysis is based, was officially launched in July 2000 as part of the second phase.

The programme's primary objective is to accelerate both land acquisition and redistribution. The implementation mechanisms of the FTLRP are to speed up the identification of not less than five million hectares of land for compulsory acquisition for resettlement (Zimbabwe 2000; Moyo 2006). Compulsory acquisition was largely to be made from white commercial farmers, private companies and absentee landlords. The programme comprises two models: Model A1 is intended to decongest communal areas and is targeted at land-constrained farmers in communal areas. This model is based on existing communal area organisation whereby peasants produce mainly for subsistence. Model A2, on the other hand, is a commercial settlement scheme comprising small-, medium- and large-scale commercial settlements intended to create a cadre of black commercial farmers. This is in principle targeted at any Zimbabwean citizen who can prove farming experience and/or resource

[1] The Lancaster House Constitution obligated the government to acquire land on a willing-seller/willing-buyer basis during the first ten years of independence.

availability and is based on the concept of full cost recovery from the beneficiary (Zimbabwe 2000). Model A1 compromises the bulk of the programme.

This paper seeks to provide micro-evidence on the impact of the FTLRP beneficiaries' perceptions of land tenure security and subsequently agricultural productivity. This link is explored using data on programme beneficiaries and a control group of communal farmers, who applied for land under FTLRP but were rejected. We focus on farmers who have benefited from the FTLRP under Model A1 scheme vis-à-vis communal farmers. The latter group cultivate land that was traditionally designated by the colonial rule for black subsistence farmers. The departure point of the paper is that the programme created some perceived tenure insecurities among it beneficiaries which is hypothesised to have an adverse impact on land-related investments which subsequently constrains agricultural productivity.

The following section describes the study site and the data used in the empirical analysis. The conceptual framework and econometric results are discussed in section 3. Section 4 concludes the paper.

Study setting, data and descriptive analysis

The data and survey area

The empirical analysis of this paper is based on data collected from Mazowe District, one of the seven districts in the Mashonaland Central province in Zimbabwe. In terms of agro-ecological zones or Natural Regions, the land in the district belongs to Natural regions 2 and 3.[2] Natural region 2 is characterised by intensive farming and receives moderately high rainfall (750-1000mm) during the summer season (October and April). This region is suitable for intensive crop or livestock farming systems. Natural region 3, on the other hand, is subject to semi-intensive farming and moderate precipitation (650-800mm) with severe mid-season dry spells and high temperatures. This region is suitable for livestock production, fodder and cash crop farming. Mazowe District is divided into 29 wards, 13 of which are found in Chiweshe communal areas.

The data is obtained from a survey specially conducted for this study in May 2007. The data cover 523 parcels[3] belongings to 365 randomly selected households falling under three different chieftainships, Chief Chiweshe, Chief Makope and Chief Negomo. The sample includes 213 communal households (operating 371 parcels) and 152 FTLRP beneficiaries (operating 152 parcels). A parcel is defined as a contiguous piece of land on which one or more different crops can be cultivated. Households in communal areas operate, on average, more than one parcel. In the resettlement areas, however, every household operates only one parcel. The questionnaire contained detailed questions on households' production accounts, socioeconomic indicators, parcel characteristics and information on agricultural investments farmers made in the five years prior to the survey.

[2] On the basis of climatic pattern, altitude and soil type, the country is classified into five agro-ecological regions with agricultural potential declining from natural region 1 to 5.
[3] A parcel is defined as a contiguous piece of land on which one or more different crops can be cultivated.

From a methodological view point, comparing agricultural productivity of FTRLP beneficiaries and a random control group of communal households made up of applicant and non-applicant households is likely to suffer from 'self-selection problems' thereby providing biased estimates of the impact of the FTLRP on agricultural productivity. Self-selection problems arise from the possibility that non-applicants, out of choice, might have decided not to participate in the programme, presumably because they were not eligible, were already doing relatively well or were apprehensive about the FTLRP. Thus a more reliable comparison between FTLRP beneficiaries and non-beneficiaries would be attained if the control group is drawn from those who were eligible but not accepted in the programme. Accordingly, in order to minimize the self-selection problems we restrict our sample to FTLRP beneficiaries and communal farmers who applied for land under the FTLRP but were rejected. The resulting sample comprises 103 communal households (operating 182 parcels) and 152 FTLRP beneficiaries (operating 152 parcels), giving us a total of 255 farmers and 334 parcels.

It can be argued that the use of communal farmers as a control group is inappropriate considering that the FTLRP farmers might be cultivating better quality land in better agro-ecological zones. However communal and resettlement areas used in the paper fall in fairly similar agro-ecological zones since there are adjacent to each other. With regards to better land quality, the empirical analysis attempts to make use of fairly limited data on the parcel characteristics to control, as much as possible, for differences in land quality.

Descriptive statistical analysis

Descriptive analysis of our data shows that around 45% of the surveyed parcels used in the analysis were acquired through the FTLRP. Of the communal parcels: 21% of the parcels were inherited, 25% allocated to the household by a traditional leader, 4% rented and 5% bought. The data thus reveals thin land rental and sales markets.

Perceptions on tenure security

Indicators of tenure are confined to farmers' perceptions about the security of tenure of their parcels. The focus on perceptions stems from the realisation that household behaviour depends largely on their perceptions. The data includes three indicators of perceptions of parcel-level tenure security: (1) the perceived right to bequeath the parcel *Bequeath*, (2) the perceived ease of renting out the parcel, *Rent out* and (3) the perceived ease of using the parcel as collateral against a financial loan, *Collateral*. These indicators are all dummy variables with a value of one if the answer is in the affirmative, and zero otherwise.

To utilise all the information gathered we use Principal Components Analysis (PCA) to construct an overall indicator or score of tenure security: *Tenure security*. It is used here to statistically weigh the three indicators or dummy variables in order to calculate an aggregate index of tenure security. We retained a component that had an eigen-value higher than one and in this component all the three indicators had loadings or weights of more than 0.3 implying that the component we use here is influenced by all of the three indicators. We used these weights to generate the variable *Tenure security* (see Jolliffe 1986 for more details on the PCA method).

The use of perceptions here needs qualification. While bequeathing and renting out land is commonly practiced in rural Zimbabwe, use of land as collateral is not common. In reality both FTLRP and communal lands are not acceptable by banks as collateral for financial loans. Nevertheless the interesting aspect of using perceptions is that it reveals such

inconsistencies between what farmers perceived to be true and the reality on the ground should they decide to act on those perceptions. Here using land as collateral is in reality almost impossible. However a number of farmers seem to believe they can easily do it: this doesn't mean however that they have done it. The point here is that this could indicate what they perceive is the control they have over their land, which in itself an indicator of (perceived) tenure security.

We present summary statistics of these perceived tenure security indicators, at parcel level, in Table 1 below. In addition Table 1 also shows two-sample *t*-tests to test for differences between the FTLRP and communal groups.

Table 1: Perceived tenure security of FTLRP and communal farmers

Tenure security indicator	Communal	FTLRP	*t*-tests	Pooled
Bequeath (%)	79	57	***	685
Rent out (%)	22	22		22
Collateral (%)	40	22	***	32
Tenure security	0.77	0.55	***	0.67

*Source: Own survey data 2007. *Difference significant at 10%; ** significant at 5%; *** significant at 1% level of significance.*

Table 1 suggests that in overall, the communal group exhibits higher levels of perceived tenure security than the FTLRP group. Notably these differences are statistically significant in the case of the perceived right to bequeath the parcel as well as the perceived right to use the parcel as collateral against a financial loan. Around 79% of parcels in the communal areas are believed to have the easiness of bequeathing to children as compared to 57% in the FTLRP group. Around 40% of parcels in the communal areas are believed to be easy to use as collateral against a financial loan, compared to 22% in the FTLRP group. Using the overall indicator of perceived tenure security, *Tenure security*, we find that communal parcels score 0.22 points higher than their counterparts in the FTLRP group.

This apparent lower perceived tenure security in the FTLRP group could be reflecting the reality that, although in principle, the tenure arrangements within the FTLRP entail permits for Model A1 beneficiaries and a 99-year lease for Model A2 beneficiaries, FTLRP beneficiaries have been issued many different types of offer letters that the government intends to convert in the future to permanent leases. This uncertainty regarding tenure arrangements, together with the use of different sets of laws, administration and policies on multiple tenure systems (Munyuki-Hungwe and Matondi 2006) might be a source of tenure insecurity among FTLRP beneficiaries. Moreover the programme was associated with radical farm acquisitions from landowners which could make beneficiaries concerned that the same could also happen to them in the future.

Investment dynamics

The statistics on perceived tenure security give rise to an interesting research question: could it be the case that low perceived tenure security led to a reduction in agricultural investments and specifically land-related investments in the FTLRP group? To attempt to answer this question we focus on four asset types: oxen, total livestock measured in Tropical Livestock Units, on-farm trees (disregarding the type of trees planted) and soil conservation structures. Oxen and livestock holdings are presented at household level while on-farm tree and soil conservation levels are presented at parcel level. The need to distinguish between

household and parcel level arises from the fact that some households operate more than on parcel when it comes to crop production.

Oxen holdings are viewed as a direct input in crop production since these are often used for ploughing. Moreover oxen and livestock holdings are often used as an indicator of wealth especially given that financial markets are often missing in rural communities. This implies that livestock holdings indicate how capable the household is to amass resources needed for farm operations. The type of soil conservation structures we focus on are contour ridges. The decision to focus on contour ridges was guided not only by availability of data but also by their popularity as soil conservation technology in the study area. Contour ridges are earthen ridges which continue to be widely used in southern Africa as a means of controlling soil erosion (Critchley et al. 1992). Analogously, on-farm tree planting has been found to help prevent soil erosion and depending on the type of trees, enhance soil fertility.

In Table 2 below we consider accumulation dynamics with regards to the above asset types. We start by presenting data on initial endowments of these assets (defined as the levels that the household had in the year 2002, five years prior to the survey) followed by investments made in the five years prior to the survey (i.e. between 2002 and 2007) as well as the current totals. In all cases we report both the percentage of households or parcels with a given asset as well as the actual levels of the asset.

Table 2: Asset accumulation dynamics of FTLRP and communal farmers

	Communal	FTLRP	*t*-tests	Pooled
Initial Endowment in 2002				
Oxen (%)	56	30	***	41
Oxen	1.25	0.65	***	0.89
Livestock (%)	76	64	*	69
Livestock	3.52	2.09	***	2.66
Trees (%)	26	17	**	22
Trees	3.82	0.63	***	2.37
Soil conservation structures (%)	63	50	**	57
Soil conservation structures	214	132.11	***	176.73
Investments undertaken since 2002				
Oxen (%)	18	26		23
Oxen	23	63	***	47
Livestock (%)	61	57		59
Livestock	0.71	1.39	**	1.11
Trees (%)	23	30		26
Trees	3.32	1.88		2.66
Soil conservation structures (%)	34	36		35
Soil conservation structures	106.87	55.04	***	83.28
Current total				
Oxen (%)	62	45	***	52
Oxen	1.49	1.26		1.35
Livestock (%)	94	81	***	86
Livestock	4.22	3.48		3.78
Trees (%)	36	39		37
Trees	7.14	2.51	**	5.03
Soil conservation structures (%)	74	63	**	69
Soil conservation structures	320.87	187.14	***	260.01

*Source: Own survey data 2007. *Difference significant at 10%; ** significant at 5%; *** significant at 1% level of significance.*

Table 2 indicates that although communal farmers had a statistically significant initial advantage is terms of oxen holdings –around 56% of communal farmers had oxen in 2002 compared to 30% for the FTLRP beneficiaries- the FTLRP beneficiaries managed to close the gap through buying significantly more than the communal group since the year 2002. As a result current levels of oxen levels do not differ significantly between the two groups. Similarly, in terms of total livestock holdings, the FTLRP group managed to close the gap although the percentage of communal farmers with non-zero levels of livestock is significantly more than that of the FTLRP group.

Our result is consistent with that fact that when asked to identify benefits from the FTLRP, 65% of the beneficiaries cited asset accumulation as a visible benefit. On average, about 97% of the beneficiaries perceive the FTLRP as having improved their livelihoods. Accordingly one could deduce that FTLRP has been accompanied by tangible benefits to its beneficiaries, captured here by the beneficiaries' ability to accumulate livestock.

One of the objectives of the FTLRP's Model A1 scheme is to alleviate poverty implying that selection into the FTLRP should favour poor households. Taking livestock holdings as a proxy for wealth in this study the fact that the FTLRP group had significantly lower oxen and livestock endowments could be pointing to a systematic attempt by the government to prioritise poor households as beneficiaries of the programme.

Descriptive statistics indicate that on-farm trees, just like construction of contour ridges, are predominantly a communal area practice. Communal farmers exhibit significantly higher initial endowments and higher current total levels of both on-farm trees and contour ridges compared to FTLRP beneficiaries. In terms of investments, however, only the differences in soil conservation investments are significant, with communal farmers investing in an average of about 52 square meters per hectare more than the FTLRP group. The average area of contour ridges investments is around 83 square metres per hectare. On average, about 26% of the sampled farmers invested in on-farm trees in the five years preceding the survey while about 35% of the surveyed parcels had soil conservation investments. This is in spite of the fact that communal farmers have higher on-farm tree and contour ridges endowments than FTLRP farmers. This specific result together with the fact that the data suggests that communal farmers have stronger perceptions of tenure security compared to FTLRP beneficiaries could point towards the negative impact of insecure tenure on long term farm investments. Studies suggest that tenure security is more important when one considers medium- to long-term investments; hence the justification of investigating the impact of tenure security on long-term investments such as tree planting and construction of soil conservation structures (Besley 1995; Hayes et al. 1997; Holden and Yohannes 2002). However, the empirical evidence on the link between tenure security and land-related investments is mixed (see Brasselle et al. 2002 for a comprehensive survey of empirical studies on land tenure and investments in Africa). Some empirical literature failed to find the theoretically postulated positive impact of tenure security on land-related investments (Gavian and Fafchamps 1996).

However in the case of Zimbabwe it is important to acknowledge that there could be other factors that could explain reduced farm investments. In particular it is important to note that the FTLRP occurred at the same time when there was a general economic decline (specifically hyperinflation and reduced external finance to support farmers) and this could also have impacted the capacity to conduct farm investments.

Productivity analysis

Given that the descriptive statistics presented so far suggest a positive link between tenure security and land-related investment, specifically soil conservation investment, how will this affect the productivity of FTLRP beneficiaries compared to that of communal farmers, who are apparently more tenure secure? In trying to answer this question we start by exploring the differences in the cropping patterns between the two groups. Table 3 below presents the cropping patterns across the two groups. It reports the percentages of parcels with a given crop for each group as well as for the pooled sample. Results from two-tailed sample tests indicate that significant cropping differences between the two groups prevail with regards to maize, soya and sugar beans, tobacco, cotton, sorghum, and wheat.

Table 3: Crop production patterns (%): FTLRP versus communal farmers

Crop	Resettlement	Communal	Pooled
Maize	97.37	89.56	93.11
Soya beans	46.05	13.18	28.14
Sugar beans	16.45	4.39	9.88
Groundnuts	25.00	32.42	29.04
Tobacco	15.13	1.20	7.49
Cotton	9.21	0.55	4.49
Roundnuts	7.89	6.59	7.19
Sunflower	7.24	7.14	7.19
Sorghum	5.26	0.00	2.4
Wheat	1.32	0.00	0.6
Paprika	0.66	0.55	0.6
Cowpeas	0.66	1.65	1.2
Rapoko	0.66	1.65	1.2
Rice	0.66	0.55	0.6

Source: Own survey data 2007.

Although the parcels are a multi-cropping system, data reveals maize as the major crop, produced on 90% and 97% of surveyed communal and FTLRP parcels respectively. Overall, 93% of the pooled sample of surveyed parcels had maize. The trends observed in Table 3 above are consistent with evidence that shows that under the FTLRP the four main commercial field crops, which include wheat, tobacco, soybeans and sunflower, have experienced reduced area plantings due to low uptake and use of land as well as inexperience and lack of resources on the part of new farmers (Moyo 2004).

We also examined whether cropping differences exist between male and female headed households. The patterns are presented in Table 4 below. Significant differences exist with regards to the prevalence of cow peas, soya and sugar beans. Male headed households have significantly higher incidence of cropping soya and sugar beans, while women exhibit significantly higher rates of cropping cowpeas.

Table 4: Crop production patterns (%): male versus female headed households

Crop	Male heads	Female heads	Pooled
Maize	92.83	93.98	93.11
Soya beans	32.27	15.66	28.14
Sugar beans	11.55	4.82	9.88
Groundnuts	30.28	25.30	29.04
Tobacco	7.97	6.02	7.49
Cotton	3.98	6.02	4.49
Roundnuts	7.17	7.22	7.19
Sunflower	6.77	8.43	7.19
Sorghum	2.78	1.20	2.4
Wheat	0.80	0.00	0.6
Paprika	0.80	0.00	0.6
Cowpeas	0.40	3.61	1.2
Rapoko	1.59	0.00	1.2
Rice	0.80	0.00	0.6

Source: Own survey data 2007.

Given that our analysis is based on multi-output parcels and the hyperinflationary environment in Zimbabwe, which makes price information unreliable, our aggregation of the value of production is based on South African producer prices (in Rands).[4] In Table 5 below we report the value of output differences between the two groups, based on the pooled sample. In addition we report differences between male and female headed households in the pooled sample, as well as in the sub-samples i.e. we also test for gendered productivity differences in the FTLRP and communal groups separately.

[4] The South African producer prices are chosen here due to the fact that South Africa is Zimbabwe's key trading partner and enjoys better economic stability than Zimbabwe.

Table 5: Value of total output per hectare (yields) and maize output in kilograms per hectare

Pooled sample				
	FTLRP	Communal	t-tests	Pooled sample
Total yields	2404.53	587.27	***	1414.29
Maize yields	2400.89	892.87	***	1579.16
	Male headed	Female headed	t-tests	Pooled sample
Total yields	1567.01	952.45	*	1414.29
Maize yields	1686.05	1255.89	**	1579.16
Sub-samples				
FTLRP sub-sample				
	Male headed	Female headed	t-tests	Pooled
Total yields	2576.17	1785.59		2404.53
Maize yields	2496.34	2056.70		2400.89
Communal sub-sample				
	Male headed	Female headed	t-tests	Pooled
Total yields	657.23	402.57	*	587.27
Maize yields	955.57	727.35		892.87

*Source: Own survey data 2007. *Difference significant at 10%; ** significant at 5%; *** significant at 1% level of significance.*

The average value of output per hectare for the whole sample is around Rand 1414. The value of output is more than three times higher per hectare for FTLRP, with a mean of Rand 2404 compared to Rand 587 for the communal farmers. This difference has high statistical significance. However only marginal total yield differences exist in terms of gender: male headed households have marginally significant higher total yields in the pooled sample as well as in the communal sub-sample. No gendered productivity differentials are exhibited in the FTLRP group.

In terms of maize yields, summary statistics indicate that the average maize output per hectare is 2400kg for the FTLRP parcels, 893kg in communal areas and 1579kg for the whole sample. Comparing this to the national statistics in 1999, just before the launch of the FTLRP, we realise that while the figure for the FTLRP group exceeds that of 1999 for the communal areas (1024kg), it falls far short of the average for the commercial farming sector (4393kg) (Mudimu 2003). It is important to note, however, that these 1999 yield figures in the commercial farming sector were achieved over many years while the FTLRP farmers have been there for less than ten years. This implies that comparisons should be done cautiously. Maize is Zimbabwe's staple food and as such it plays a crucial role in the country's food security situation. In post-colonial Zimbabwe, the smallholder farming sector produced around 60% of all maize (Andersson 2007). While the pooled sample suggest that male headed household produce significantly more maize per hectare than female headed household, these gendered differences are not significant in the sub-samples.

These results present a paradox: FTLRP beneficiaries are apparently less land tenure secure, invest less in land-related investments but they are more productive.[5] Theoretical postulation and empirical findings postulates that more secure tenure results in higher medium to long term land-related investments which in turn enhance productivity. Given this scenario, what then explains the higher productivity in the FTLRP group?

Input analysis

Looking at the statistics on input usage between the two groups, it would seem plausible to argue that these observed output differences are partly due to the two groups' differences in input usage. As reported in Table 6 below the FTLRP subsample use significantly more fertilisers, oxen and tractors while communal farmers try to substitute by using manure and household labour intensively. Due to the fact that only 3% of communal farmers use tractors, we used oxen and tractor days to construct an overall indicator of traction days, *Traction,* using PCA.

Table 6: Input usage of FTLRP and communal farmers

Input	Communal	FTLRP	*t*-tests	Pooled
Fertiliser, kg per hectare	101.70	249.55	***	168.99
Tractor days, per hectare	0.02	0.26	***	0.13
Oxen days per hectare	1.21	1.70	***	1.43
Traction per hectare	0.87	1.39	***	1.11
Manure, kg per hectare	572.03	95.66	***	355.24
Household labour	1.94	0.69	***	1.39
Hired labour	1.23	1.44		1.32

*Source: Own survey data 2007. *Difference significant at 10%; ** significant at 5%; *** significant at 1% level of significance.*

Further, the output differences between the two groups could be due to some unobserved differences in parcel characteristics between the two groups that enhance the productivity of inputs in the FTLRP group. One possibility is that under colonial rule commercial farmers had access to more fertile land, implying that the results hinge on how effectively our soil quality indicators are able to capture this.

Other variables and selection into FTRLP

Summary statistics for the rest of the variables used in the paper are reported in Tables 7 below. We also perform two-sample *t*-tests to test for differences between the FTLRP and the communal groups.

In addition to helping us characterise households in the two groups, summary statistics allow us to be able to explore how households' socio-economic characteristics predispose them for selection into the programme.

[5] Use of the propensity score matching semi-parametric estimation techniques also confirmed these trends. These techniques allow matching of FTLRP and communal farmers based on the closeness of their propensity score which is defined as the probability of being in the FTLRP group, conditional on the household's socio-economic and parcel characteristics. Mean outcomes are then computed for the two groups. Since the results from this analysis confirmed the trends revealed by the summary statistics, they do not add any new information and thus are not reported here.

Table 7: Descriptive statistics of parcel and household level variables

Variable	Description	Communal	FTLRP	*t*-tests	Pooled
Parcel characteristics					
Parcel size	Size of the parcel, in hectares	4.06	6.41	***	5.13
Steep slope	Steep slope (1=yes, 0=no)	0.10	0.09		0.10
Moderate slope	Moderate slope (1=yes, 0=no)	0.44	0.74	***	0.57
Light slope	Low slope (1=yes, 0=no). The reference slope variable.	0.46	0.17	***	0.32
Clay soil	Predominant soil type clay (1=yes, 0=no)	0.07	0.02	**	0.05
Clay-loam soil	Predominant soil type clay-loam (1=yes, 0=no)	0.28	0.44	***	0.35
Sandy soil	Predominant soil type sandy (1=yes, 0=no)	0.56	0.20	***	0.40
Red soil	Predominant soil type red (1=yes, 0=no). The reference soil type variable.	0.09	0.34	***	0.20
Socio-economic characteristics					
Farm size	Farm size in hectares	7.96	6.41	**	7.04
Gender	Gender of the household head (1=male, 0=female)	0.73	0.78		0.76
Age	Age of the household head	52.32	45.96	***	48.53
Education	Number of years of formal schooling of the household head	8.43	9.19	*	8.88
Experience	Number of years of farming experience of the household head	22.39	13.32	***	16.94
Household size	Total number of household members	6.91	6.57		6.75
Communal farmer2000	Household head a communal farmer before FTLRP (1=yes, 0=no).	0.98	0.41	***	0.72
Farm worker2000	Household head farm worker before FTLRP (1=yes, 0=no)	0.00	0.09	***	0.04
Non-farmer2000	Household head engaged in non-farming before FTLRP (1=yes, 0=no)	0.02	0.50	***	0.24
Remittances	Receipt of remittances (1=yes, 0=no)	0.42	0.25	***	0.32
Extension contact	Number of visits by an extension worker in the last agricultural season	2.52	6.29	***	4.77
TV	Access to TV (1=yes, 0=no)	0.35	0.58	***	0.49
Radio	Access to radio (1=yes, 0=no)	0.67	0.79	**	0.74
Newspapers	Access to newspapers (1=yes, 0=no)	0.33	0.44	*	0.40
Makope	Chief Makope (1=Chief Makope). The reference chieftainship variable.	0.26	0.13	***	0.18
Chiweshe	Chief Chiweshe (1=Chief Chiweshe)	0.11	0.47	***	0.32
Negomo	Chief Negomo (1=Chief Negomo)	0.63	0.40	***	0.49

*Source: Own survey data 2007. * Difference significant at 10%; ** significant at 5%; *** significant at 1% level of significance.*

The summary statistics demonstrate that on average, FTLRP beneficiaries have a significantly higher parcel size than communal farmers. However they have smaller farm sizes. This is due to the fact that FTLRP farms are not fragmented in the sense that each FTLRP household has one parcel which is then also reflected as the farm, whereas multiple parcel ownership is reported in the communal group.

A household head of a FTLRP household is typically 6 years younger, has one more year of schooling (more educated) with significantly higher access to media sources (i.e. TV, radio and newspapers) than their communal counterpart. However the FTLRP head typically has 9 years less of farming experience. No significant differences between the two groups exist with regards to household size. The data also indicates that communal households are more likely to receive remittances compared to FTLRP households: 42% of communal households have access to remittances compared to 25% in the FTLRP group.

While the incidence of female-headed households is higher in the FTLRP group, this difference is insignificant. However we note that women now have qualitatively better land rights under the FTLRP than within the communal areas. There is also joint ownership of land, between husband and wife, under the FTLRP. In total, 76% of the sample households are male headed.

Furthermore, the decongestion objective implies that we would expect priority to be given to communal households when it comes to selection into the FTLRP. However, contradictory to the programme's goal of decongesting communal areas, the results indicate that only 41% of the FTLRP beneficiaries were communal farmers prior to being allocated land under the FTLRP. The assumption here is that if the decongestion objective was to be fully met, then most of the beneficiaries should have come from communal areas, loosely speaking. Former commercial farm workers constitute only 9% of the beneficiaries while 50% were engaged in non-farming activities before 2001. These statistics suggest that although commercial farm workers were already in the system, they do not seem to have benefited from the programme. However caution is called for in interpreting this finding since the data is not able to reveal whether they had any land of their own prior to the reform. In addition 50% of the beneficiaries had a household head who was engaged in non-farm activities before the programme. Interpreting this finding requires an acknowledgement of the possibility that those engaged in non-farm activities prior to the FTLRP were forced to do so due to landlessness.

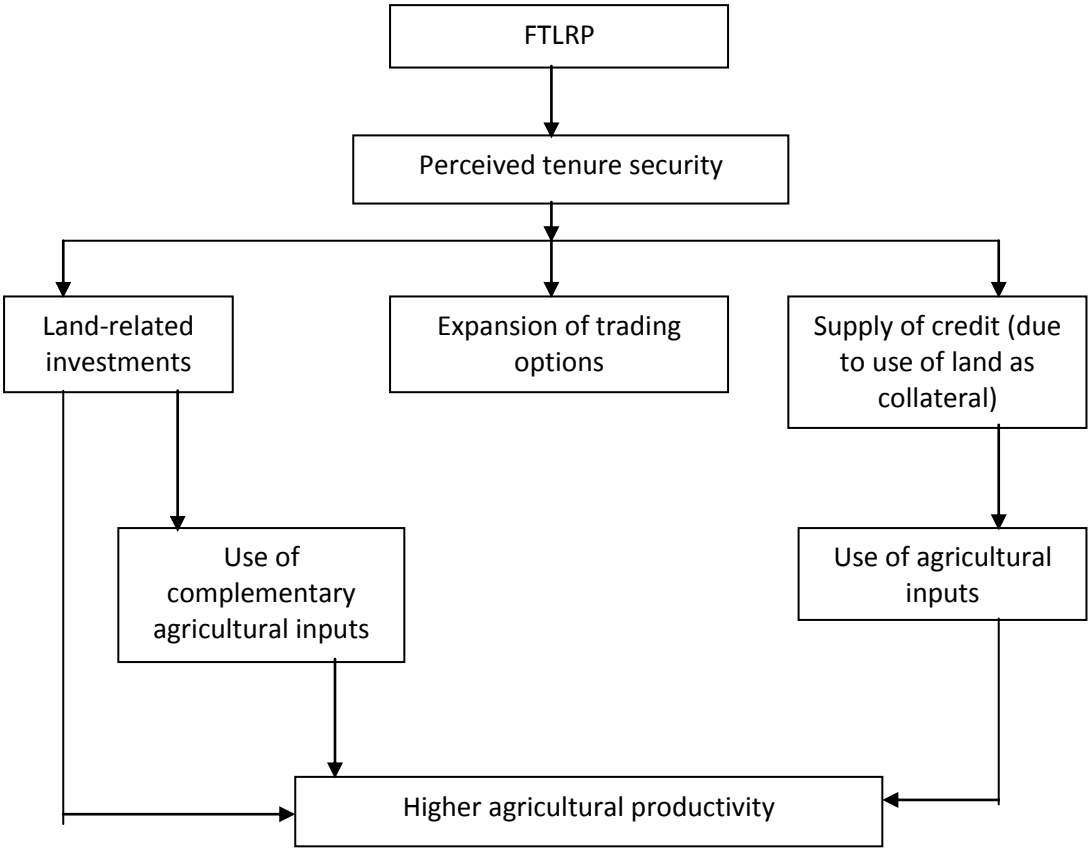
Finally we find support for the criticisms that extension services have been traditionally confined to resettlement farmers: the number of visits by an extension worker to an average FTLRP household is almost twice that of visits to an average communal household.

FTLRP and agricultural productivity: econometric analysis

The conceptual framework pursued to examine the link between FTLRP and agricultural productivity is presented in Figure 1 below and follows from the postulation of economic theory that secure land rights: reduce the risk associated with farming through the threat of dispossession; make it easier to collateralise land and as a result reduce the price of capital and subsequently increase the value of investments; increase investment incentives by lowering transaction costs if land is to be either rented out or sold, thereby expanding trading opportunities and the ability to take advantage of gains from

trade (Besley 1995). Thus it is hypothesised that tenure security affects productivity through enhancing agricultural investment or increased access to credit that can be used to finance agricultural inputs.

Figure 1: Conceptual model linking FTLRP and agricultural productivity



The conceptual framework highlights both demand-side and supply-side implications of increased tenure security. The demand-side is the increased demand for land-related investments when land tenure is secure since under these circumstances the probability that the farmer captures the returns from such investment increases. This will also increase the demand for complementary inputs due to increased returns from land-related investments. The supply-side demonstrates that secure tenure improves the creditworthiness of the landholder thereby enhancing the collateral value of that land, raising the lender's expected returns.

FTLRP and agricultural productivity

As mention above, descriptive statistics present a paradox: FTLRP beneficiaries are less land tenure secure, invest less in land-related investments but they are more productive. These results imply that the argument that the FTLRP has been associated with tenure insecurity this could negatively impact farm investments and subsequently farm productivity loses relevance or is weak in explaining the productivity differentials. Thus in trying to explain why FTLRP beneficiaries are more productive than communal farmers we draw on existing evidence that shows that resettled farmers have better access to inputs and government services (Deininger et al. 2002; Jowah 2005), which could give them a productivity advantage. We define agricultural productivity as the value of total agricultural output per

hectare i.e. land productivity. Land productivity is important in determining food production, land use incentives and returns to landowners (Wiebe 2003). Returns to agricultural land use are a natural measure to focus on in Zimbabwe where land is a contentious issue as reflected by the centrality of land reforms in the socioeconomic and political sphere.

Accordingly we assume and specify a Cobb-Douglas production function[6] as follows:

$$\ln(Yield) = \beta_0 + \beta_1 R + \beta_2 \ln X + \varepsilon \quad (1)$$

where $Yield$ is the value of total agricultural output per hectare for the *j*th parcel. Note that our aggregation of the value of production is based on South African producer prices. R is a dummy indicating whether or not the household obtained the parcel via the FTLRP, intended to capture whether or not FTLRP beneficiaries have a productivity advantage. X is a vector of exogenous parcel characteristics and inputs used. These include standard factors of production, i.e. labour used per hectare (we disaggregate this to the number of household members and hired workers who worked on a given parcel in the season under analysis); the household head's years of farming experience as an indicator of human capital and gender to test whether gendered differences exist with regards to productivity; non-labour variable inputs- including the amount of chemical fertiliser and manure used per hectare; and traction power- capturing the number of days the household used oxen and/or a tractor to plough the parcel. We treat soil conservation as an input in agricultural production by including the area of contour ridges constructed in the last five years per hectare. We also include dummies for the slope of the parcel and predominant soil type as exogenous parcel characteristics. The parameters to be estimated are denote by β_0, β_1 and β_2. ε is an error term which captures all unobserved factors that contribute to explaining productivity. It is assumed to be independently, identically and normally distributed with zero mean and constant variance (Wooldridge 2002).

The results from an Ordinary Least Squares (OLS) estimation of the Cobb-Douglas production function specified above are reported in Table 8 below. To explore whether there are differences in the way different inputs impact productivity of the two groups we also estimate separate production functions for the two groups (results are also presented in Table 8 below). This is similar to including interaction terms for being a FTLRP beneficiary with the inputs, in line with Deininger et al. (2002).

The dependent variable is *Total Yields*, i.e. the value of total agricultural output per hectare, in South African Rands. All continuous variables used in the ensuing analysis are in logarithmic forms, following the Cobb-Douglas specification in equation (1).

The primary objective of this section is to use parametric econometric methods to identify the source of the productivity advantage enjoyed by the FTLRP group over the communal group. As a result the ensuing discussion of the results reported in Table 8 is based on the separate estimations of the

[6] A Cobb-Douglas production function is a technical description of the relationship between production levels (value of total output in our analysis) and different inputs used in the production process. This specification is chosen here due to the ease of interpreting results from its estimation (the estimated coefficients are interpreted as elasticities). While specifications such as the translog production function provide the opportunity to characterize the data in a more flexible way, with limited data it also tends to be over-parameterized. Hence the more restrictive Cobb–Douglas form was used.

production functions since they give more information on the way different inputs affect productivity in the two groups.

Table 8: OLS estimation of agricultural productivity

	Pooled sample		FTLRP group		Communal group	
Variables	Coefficient	Robust Std. Error	Coefficient	Robust Std. Error	Coefficient	Robust Std. Error
FTLRP	1.533***	0.209				
Inputs						
Gender	0.155	0.150	0.117	0.231	0.214	0.203
Fertiliser	0.204***	0.050	0.296***	0.075	0.105	0.070
Manure	-0.002	0.023	0.009	0.034	-0.000	0.027
Traction	0.120**	0.055	0.090	0.055	0.301	0.187
Household labour	0.463**	0.181	0.016	0.608	0.461**	0.195
Hired Labour	0.213	0.146	0.636**	0.316	0.086	0.192
Soil conservation	0.063**	0.026	0.044	0.040	0.063*	0.036
Experience	0.168*	0.100	0.156	0.170	0.145	0.133
Exogenous parcel characteristics						
Farm size	0.300*	0.181	0.503	0.450	0.328	0.214
Steep slope	-0.092	0.222	-0.384	0.311	0.153	0.302
Moderate slope	-0.083	0.151	0.136	0.255	-0.125	0.234
Clay	0.592*	0.341	0.894	0.727	0.317	0.408
Clay-loam soil	-0.222	0.175	-0.280	0.200	-0.196	0.348
Sandy soil	0.064	0.176	0.025	0.241	0.002	0.282
Chiweshe	-0.626***	0.205	-1.283***	0.231	-0.033	0.355
Negomo	-0.446**	0.181	-1.231***	0.236	-0.195	0.231
Constant	3.215***	0.616	4.453***	1.137	3.120***	0.801
Observations	330		152		178	
R-squared	0.40		0.40		0.20	
F-test (p-value)	0.000		0.000		0.0001	

*Note: * significant at 10%; ** significant at 5%; *** significant at 1% level of significance.*

To begin with, results from the estimation on the pooled sample confirm the productivity advantage of FTLRP beneficiaries; i.e. beneficiaries achieve higher land productivity than communal farmers. This is in line with results from the summary statistic of the data. What could explain these productivity differentials?

Results from estimating the production functions separately highlight two things: First, conventional agricultural inputs matter for productivity. Second these inputs affect productivity differently in the two groups or rather different inputs enhance agricultural productivity in the two groups. This means that

not only the allocation of inputs (as illustrated in the summary statistics) but also the returns from these inputs differ between the two groups.

Although fertiliser application per hectare is found to be associated with higher productivity in the pooled sample, this result is driven purely by the FTLRP group. Specifically fertiliser enhances productivity only in the FTLRP group and has no significant productivity gains in communal group. Increasing fertiliser use by 1% in the FTLRP group leads to an almost 30% increase in productivity. The insignificant impact of fertiliser on productivity of communal parcels could be a result of the fact that the communal group applies low levels of fertiliser (far below half of what the FTLRP group applies on average). In support of this argument, the data indicates that when asked to identify constraints to cultivating on their land, around 44% of the communal farmers cited lack of fertiliser as a constraint compared to 31% in the FTLRP group. In addition, the FTLRP derives relatively huge productivity gains from hired labour: increasing use of hired labour by 1% leads to an almost 64% productivity increase. Hired labour has however no impact on the productivity of communal parcels.

Communal farmers, on the other hand, get a significant productivity enhancement from using household labour: increasing use of household labour by 1% in the communal group leads to an almost 46% productivity increase. In addition the communal group enjoys productivity gains due to existence of soil conservation structures, with a 1% increase in the area under contour ridges being associated with a marginally significant 6% increase in productivity.

It is worth noting here the insignificance of manure use on productivity, especially given that the communal group uses significantly more manure per hectare than the FTLRP group. This result could indicate that farmers are using poor quality manure. Findings by Mugwira and Mukurumbira (1984) argue that the effectiveness of manure in improving crop yield is compromised by its low nutrient content (phosphate in particular). Furthermore, Mutiro and Murwira (2004) reveal that the way smallholder farmers store and apply manure has a significant impact on yields in Zimbabwe. Thus although communal farmers try to compensate for low use of other inputs by using significantly more manure than the FTLRP group, the insignificance of manure use shows that this fails to impact productivity.

As discussed in the data section, the differences in the marginal impacts of the inputs between the two groups could be due to unobserved differences in parcel characteristics (particularly differences in quality of land) between the two groups.

The significance of chieftainship dummies in the FTLRP group indicates that agricultural production might be better suited in some climatic areas and environmental factors such as rainfall, which varies across locations, may affect yields.

Agricultural intensification on the new resettlements: the importance of fertilisers

Our main finding demonstrates the significance of chemical fertilisers in enhancing crop yields, contributing to the productivity advantage that the FTLRP beneficiaries have over communal farmers. This however does not constitute a blind recommendation of increasing fertiliser application by the beneficiaries: the environmental threats that fertilisers pose need to also be considered. For example, fertiliser application could be associated with leaching of nitrogen into the groundwater and with deposition of phosphorous in surface waters through soil erosion (Larson and Frisvold 1996). Still on environmental issues: it seems that soil conservation technology could lead to a win-win situation in the

communal areas, i.e. farmers would realise increased production and at the same time reduce soil degradation.

The stark differences in chemical fertiliser use between FTLRP beneficiaries and communal farmers suggest existence of institutional constraints that limit agricultural productivity. Evidence indicates that the Zimbabwean government gives the FTLRP group preferential treatment when it comes to access to farm inputs, with the government being actively involved, through the Grain Marketing Board (GMB), in the provision of fertilisers (Jowah 2005). During the data collection, communal farmers expressed concerns that the government has tended to channel its resources to the FTLRP beneficiaries despite constant government pledges to extend the services to communal farmers. To make matters worse, price controls on fertilisers and reduced supply owing to shortages of the foreign currency needed to import raw materials, led to fertiliser shortages on the open market and hence a black market for inputs in which the price of fertilisers was far above the official controlled price and well beyond the reach of poor farmers.

Thus a thorough assessment of the true productivity gains by the FTLRP beneficiaries should account for the extra costs that the government incurs by supporting beneficiaries. It is possible that the associated costs compromise the overall household or micro-level success of the programme. Furthermore, the sustainability of such a programme is questionable, given the financial constraints faced by the government. Input support schemes should not, in general, be viewed as a long-term solution; in the long term the government should instead strive to alleviate poverty and at the same time liberalise and improve the input markets.

Conclusions

In this paper data on beneficiaries of the Fast Track Land Reform Programme (FTLRP) was used with a control group of communal farmers who applied for land under the programme but were rejected in order to explore the link between programme beneficiaries' perceptions of land tenure security and agricultural productivity. The FTLRP was launched in 2000 with the aim of accelerating both land acquisition and redistribution.

Summary statistics from the data and statistical analysis reveals interesting results. First, there is evidence that programme beneficiaries perceive themselves less land tenure secure compared to their counterparts in the communal areas. Second, beneficiaries have to date invested less in land-related investments (confined in the analysis to on-farm tree planting and construction of soil conservation structures). However contrary to economic theory and empirical studies that postulate that less perceived tenure security impacts productivity negatively (through its adverse impact on farm investments), FTLRP beneficiaries are found to be more productive compared to communal farmers.

A more careful econometric analysis reveals that the source of this productivity differential lies in differences in input usage. Specifically the FTLRP derived productivity gains from the use of chemical fertiliser and hired labour while communal farmers enjoy productivity gains from using household labour and soil conservation.

The results are informative to the government of Zimbabwe as it seeks to revive the agriculture sector. First there is need to clarify and formalise land tenure arrangements within the programme. Second as conventional wisdom says: agricultural inputs matter for production.

References

Andersson, J.A. (2007).' How much did property rights matter? Understanding food insecurity in Zimbabwe: A critique of Richardson'. *African Affairs* 106(425): 681-690.

Besley, T. (1995). 'Property rights and investment incentives: Theory and evidence from Ghana'. *Journal of Political Economy* 103(5): 903-937.

Brasselle, A., Gaspart, F. and Platteau, J. (2002). 'Land tenure security and investment incentives: puzzling evidence from Burkina Faso'. *Journal of Development Economics* 67: 373-418.

Commission for Africa. (2005). *Our Common Interest*. Report of the Commission for Africa.

Critchley, W., Reij, C. and Seznec. A. (1992). 'Water harvesting for plant production. Volume II: case studies and conclusions for sub-Saharan Africa'. *World Bank Technical Paper* No. 157.

Deininger, K., Hoogeveen, H. and Kinsey, B.H. (2002). 'Benefits and costs of land reform in Zimbabwe with implications for Southern Africa'.

FAO. (2005). T*he state of food insecurity in the World 2005: Eradicating world hunger, key to achieving the Millennium Development Goals.* Rome: Food Agriculture Organization of the United Nations.

Gavian, S. and Fafchamps. M. (1996). 'Land tenure and allocative efficiency in Niger'. *American Journal of Agricultural Economics* 78(2): 460-71.

Ghatak, M. and Roy, S. (2007). 'Land reform and agricultural productivity in India: a review of the evidence'. *Oxford Review of Economics Policy* 23(2): 251-269.

Hayes, J., Roth, M. and Zepeda, L. (1997). 'Tenure security, investment and productivity in Gambian agriculture: A generalized probit analysis'. *American Journal of Agricultural Economics* 79: 369-382.

Holden, S. and Yohannes, H. (2002). 'Land redistribution, tenure insecurity, and intensity of production: A study of farm households in southern Ethiopia'. *Land Economics* 78(4): 573-590.

Jolliffe, I.T. (1986). *Principal component analysis*. Springer-Verlag KG, Heidelberg, Germany.

Jowah, E.V. (2005). 'Food security in the context of the Fast Track Land Reform*'. Policy Brief Series*, Issue No. 3, AIAS, Harare.

Larson, B.A. and Frisvold, G.B. (1996). 'Fertilisers to support agricultural development in sub-Saharan Africa: what is needed and why'. *Food Policy* 21: 509–525.

Moyo, S. (2004). *Overall Impacts of the Fast Track Land Reform Programme.* Prepared for the Review of the Zimbabwean Agricultural Sector following the Implementation of the Land Reform Project Funded by the European Union, AIAS, Harare.

Moyo, S. (2006). 'The evolution of Zimbabwe's land acquisition'. In R. Mandivamba, P. Tawonezvi, C. Eicher, M. Munyuki-Hungwe, and P. Matondi (eds), *Zimbabwe's Agricultural Revolution Revisited.* University of Zimbabwe Publications.

Mudimu, G. (2003). '*Zimbabwe food security issues paper'*, Forum for Food Security in Southern Africa, ODI: London

Mugwira, L.M. and Mukurumbira, L.M. (1984). 'Relative effectiveness of fertiliser and communal area manures as plant nutrient sources'. *Zimbabwe Agricultural Journal* 82: 153-159.

Munyuki-Hungwe, M. and Matondi, P. (2006). 'The evolution of agricultural policy: 1990-2004'. In R. Mandivamba, P. Tawonezvi, C. Eicher, M. Munyuki-Hungwe and P. Matondi (eds), *Zimbabwe's Agricultural Revolution Revisited.* University of Zimbabwe Publications.

Mutiro, R.K. and Murwira, H.K. (2004). 'The profitability of manure use on maize in the smallholder sector of Zimbabwe'. In A. Bationo (ed) *Managing Nutrient Cycles to Sustain Soil Fertility in Sub-Saharan Africa*. Academy Science Publishers, Nairobi, Kenya, pp 571–582.

NEPAD. (2003). *Comprehensive African agriculture development programme*. Pretoria, South Africa: New Partnership for African Development.

UN ECA. (2004). *Land tenure systems and their impacts on food security and sustainable development in Africa*. Addis Ababa: United Nations Economic Commission for Africa.

UN Millennium Project. (2005). *Halving hunger: It can be done*. Task Force on Hunger.

Wiebe, K. (2003). 'Linking land quality, agricultural productivity and food security'. *Agricultural Economic Report* 823, Economic Research Service, United States Department of Agriculture, Washington DC.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data.* Cambridge: MIT Press.

Zimbabwe. (2000). *The Accelerated Land Reform and Resettlement Implementation Plan (Fast Track).* Harare, Ministry of Lands, Agriculture and Rural Resettlement.

Full list of Livelihoods after Land Reform in Zimbabwe Working Papers

Mujeyi, K. (2010). 'Emerging agricultural markets and marketing channels within newly resettled areas of Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 1*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Mandizadza, S. (2010). 'The Fast Track Land Reform Programme and livelihoods in Zimbabwe: A case study of households at Athlone Farm in Murehwa District'. *Livelihoods after Land Reform in Zimbabwe Working Paper 2*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Mbereko, A. (2010). 'An assessment of the outcomes of "fast track" land reform policy in Zimbabwe on rural livelihoods: the case of Gudo ward (Mazvihwa communal area) and Chirere area (A1 Resettlement area)'. *Livelihoods after Land Reform in Zimbabwe Working Paper 3*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Mashava, R. (2010). 'Confronting water challenges in a micro-irrigation scheme in the Umzingwane Catchment of Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 4*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Chingarande, S.D. (2010). 'Gender and livelihoods in Nyabamba A1 Resettlement Area, Chimanimani district of Manicaland Province in Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 5*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Marimira, S.C. (2010). 'Institutions, leadership and service delivery in new Resettlement Areas of Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 6*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Zikhali, P. (2010). 'Fast Track Land Reform Programme, tenure security and agricultural productivity in Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 7*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Chamunorwa, A. (2010). 'Comparative analysis of agricultural productivity between newly resettled farmers and communal farmers in Mashonaland East province'. *Livelihoods after Land Reform in Zimbabwe Working Paper 8*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Mujere, J. (2010). 'Land, graves and belonging: Land reform and the politics of belonging in newly resettled farms in Gutu, 2000-2009'. *Livelihoods after Land Reform in Zimbabwe Working Paper 9*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Murisa, T. (2010). 'Farmer groups, collective action and production constraints: Cases from A1 settlements in Goromonzi and Zvimba'. *Livelihoods after Land Reform in Zimbabwe Working Paper 10*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Matondi, G. (2010). 'Traditional authority and Fast Track Land Reform: Empirical evidence from Mazowe District, Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 11*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Muchara, B. (2010). 'Implications of the Fast Track Land Reform Programme on markets and market relationships for livestock, cotton and maize products in Mwenezi District of Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 12.* Livelihoods after Land Reform Project. South Africa: PLAAS.

Mutangi, G. (2010). 'The changing patterns of farm labour after the Fast Track Land Reform Programme: The case of Guruve District'. *Livelihoods after Land Reform in Zimbabwe Working Paper 13*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Chigumira, E. (2010). 'My land, my resource: Assessment of the impact of the Fast Track Land Reform Programme on the natural environment, Kadoma District, Zimbabwe'. *Livelihoods after Land Reform in Zimbabwe Working Paper 14*. Livelihoods after Land Reform Project. South Africa: PLAAS.

Moyo, P. (2010). 'Land reform In Zimbabwe and urban livelihoods transformation'. *Livelihoods after Land Reform in Zimbabwe Working Paper 15*. Livelihoods after Land Reform Project. South Africa: PLAAS.