A quantitative analysis of Zimbabwe's land reform policy: An application of Zimbabwe SAM multipliers

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Abstract

This study was designed to quantitatively investigate the economy-wide impact of land reform policies in Zimbabwe. Land reforms came with the realm of independence in Zimbabwe. Four models were used to implement the reform policies. The paper uses the updated 1991 Social Accounting Matrix for Zimbabwe and the Central Statistics Office's household data on resettled families in Zimbabwe. The paper computes the sectoral SAM multipliers and then uses household data on resettled families to simulate the impact of specific land reform models on the economy. The simulated results show that land reform, if well planned and systematically and carefully implemented, could generate economy-wide benefits for Zimbabwe and could lead to income redistribution in favour of low-income household groups, while maintaining an increase in households' aggregate income.

1. Introduction

The post-independence government of Zimbabwe inherited a highly skewed pattern of land distribution, which had a small minority of white large-scale farmers owning a disproportionately large share of the better agricultural land, while the majority of the national population farmed in the lower rainfall and poorer soil (Chitsike, 2003:2). During the colonial era, land was distributed on racial lines, with approximately 4,660 large-scale predominantly white commercial farmers owning about 14.8 million hectares and about 6 million black smallholder farmers owning about 16.4 million hectares in mainly low agricultural potential areas. Small-scale commercial farmers occupied about 1 million hectares, while state-owned farms occupied about 0.3 million hectares and 6.0 million hectares were reserved for national parks, wildlife and urban settlements (Rugube and Chambati, 2001:7; UNDP, 1998; CSO, 1998). After independence, land redistribution was highest on the list of the new government's priorities. It therefore proposed an intensive resettlement programme with the following objectives:

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i) Alleviating population pressure in the communal areas;

ii) Extending and improving the base of productive agriculture in the peasant farming sector;

iii) Improving the standard of living of the largest and poorest sector of the population;

iv) Improving the problems of and rehabilitating those adversely affected by the war;

v) Providing for the landless and the destitute;

vi) Bringing into full production the under-utilized land; and

vii) Expanding and improving the infrastructure and services that were needed to promote the wellbeing of people and economic production (Chitsike, 2003:3; Lebert, 2003:4).

Various policies and legislated Acts, from market-based government purchase and redistribution to compulsory acquisition of commercial farms without compensation, have been implemented or passed by the government to achieve the objectives of land redistribution. However, post-implementation macroeconomic indicators show that the gross domestic product has contracted by six percent in 2000 and eight percent in 2001 and was predicted to further contract in subsequent years (ECA, 2002). Output in the agricultural, mining and manufacturing sectors declined substantially in 2001, leading to many company closures and job losses. At least 25,000 jobs were lost in the manufacturing sector in the first quarter of 2001 (ECA, 2002). With these indicators, the viability of land reform in Zimbabwe is questionable. This study is therefore designed to undertake an economy-wide analysis of the possible benefits of land reform in Zimbabwe. Robilliard *et al* (2002) and Deininger *et al* (2002) separately carried out a cost-benefit study to analyze the impact of land reform in Zimbabwe. The findings suggest that land reform in Zimbabwe has a significant positive impact on the incomes and living standard of the target beneficiaries. However, these studies investigated micro-level benefits and costs, thereby neglecting an economy-wide coverage. For example, the impact of land redistribution/resettlement on the non-agriculture sectors, like the provision of services, the performance of the manufacturing sector and returns on capital were not adequately addressed in these studies. On the other hand, Bautista and Thomas (2000) did a computable general equilibrium (CGE) analysis of trade and agricultural policy reforms in Zimbabwe and concluded that land reform policies cannot simultaneously promote overall income growth and equity. Computable general equilibrium analysis, in addition to its complex assumptions, requires experts to interpret the results, which is still lacking among most of the

economic policy advisers in Africa. In between these two there is the need for a simpler model that has an economy-wide coverage. Therefore, using the social accounting matrix multiplier approach, this study is designed to quantitatively investigate the impact of land redistribution on output growth, household income generation and gross value added.

Section 2 discusses the land reform programme in Zimbabwe since independence and the land reform models. Section 3 discusses the structure of the 1991 SAM for Zimbabwe, explains the general method and the modeling procedure used for the study and the shocks applied in the model to simulate the impact of land reforms, while section 4 presents and discusses the empirical results. Section 5 summarizes the findings, draws conclusions from the results, recommends the most viable development options for Zimbabwe and highlights areas for further study on a related topic.

2. Land reform in Zimbabwe since independence

The post-independence land reform in Zimbabwe started with the Lancaster House Agreement, in which it was agreed that land should change hands through a willing seller-willing buyer mechanism with the white framers who wanted to continue farming being free to do so (Lebert, 2003:4; Chitsike, 2003).

The land reform programme was targeted at the landless, war veterans, the poor and commercial farm workers. At independence in 1980 about 70 percent of Zimbabwe's landmass, including communal areas, was owned by the state and 24 percent owned by large-scale commercial farmers.

In 1980, the targeted number of households for resettlement was 18,000 on 1.5 million hectares of land over five years, which was revised in 1982 and 1990 to include 162,000 farming families on 8.3 million hectares of land (Chitsike, 2003:4; World Bank, 1991). Between 1980 and 2000 there were numerous amendments to both the constitution and Land Acquisition Act, because the funds promised by the former colonial government to the post-independence leaders of Zimbabwe were not provided as agreed at the pre-independence Lancaster House conference. There was also an increasing political pressure on the government to fulfil its promises to the people.

Table 1 shows the number of hectares of land owned by the various categories immediately before independence and by the end of the 1990s. This shows that 3.6 million hectares of land was transferred mainly from large scale commercial farmers to resettled families. In percentage terms, this transfer

represents about 23.6 percent of land from large scale commercial farmers to the resettled families.

Table 1: Land distribution at and after independence

Land category	1980 (million ha)	1997 (million ha)	Increase/decrease in Land (million ha)	Percentage Change (%)
Communal areas	16.4	16.4	0.0	0
Resettlement areas	0.0	3.6	3.6	--
Smallholder areas	1.0	1.1	0.1	--
Large scale commercial area	14.8	11.3	-3.5	(23.68)
State farms	0.3	0.1	-0.2	(66.7)
National parks, wild life and urban settlements	6.0	6.0	0.0	0
Total	38.5	38.5	0.0	0

Source: CSO (1998); Rugube and Chambati (2001).

The implementation of the land resettlement programme was planned in four models (A, B, C, and D):

A) Intensive re-settlement on individual family basis: settler families were allocated residential stands, about five hectares of land for arable purposes and access to communal grazing land. Land was acquired by the state and apportioned into plots, and the plots re-distributed to the beneficiaries. Beneficiaries acquired tenure in the form of permits, one for settlement, one for cultivation and one for grazing. This was the dominant model used to implement land reform policies in Zimbabwe. Model A scheme accounts for about 90 percent of the overall land reform policy implementation (Deininger, Hoogeveen and Kinsey, 2002).

B) Village settlement with cooperative farming, which involved the formation of cooperatives to collectively manage farms purchased by the government and take over existing large commercial farms. This model was not intensively implemented as the cooperative schemes set up did not survive for long.

C) State farm with out-growers. This model required the commercial estate or processing facility and the settler farmers as out-growers. Beneficiaries were intensively re-settled around a core estate, providing labour for the estate and in turn receiving services from the estate. This model was not also extensively implemented.

D) Commercial grazing for communal areas. This was implemented in the southern parts of Zimbabwe, where commercial ranches were purchased for the development of livestock.

By the end of 1996, a total of 71,000 farm families were re-settled on 3.6 million hectares of land out of the proposed 162,000 on 8.3 million hectares in 1990. The area of small-scale farms increased from 1 million in 1980 to 1.1 million in 1997, while the area of large scale commercial farms decreased from 14.8 million hectares in 1980 to 11.3 million hectares in 1997 and state-owned farms from 0.3 million in 1980 to 0.1 in 1997 (GoZ, 1999; CSO, 1998; Chitsike, 2003).

3. Methodology

This section is sub-divided into the sources of data, the theoretical framework and the modeling procedure, balancing the SAM and an explanation of the simulations applied to the SAM

3.1 Data sources

The SAM used for the purpose of this paper was extracted from the 1991 micro SAM developed by Thomas and Bautista (1999). This was complemented by household data provided by the Central Statistics Office of Zimbabwe. The land transactions data used in this study are secondary data obtained from the deeds registries in Harare and Bulawayo. These data were used to compute the changes in land ownership between 1980 and 1997. The 1991 micro SAM has 36 activities and 30 commodities accounts, which are classified into 27 production sectors (15 of which are agriculture, forestry and fishery accounts, a mining account, 6 manufacturing accounts, an electricity and water account, a construction account and 3 other services accounts). It also identifies 9 primary factors of production (4 labour, 3 capital and 2 land categories), an enterprise account, 5 household groups, the government sector, which consists of 4 accounts (government transfer payments, direct taxes, indirect taxes and import taxes), investment and savings and the rest of the world.

For this study, the 88 accounts in the 1991 Micro SAM were aggregated to 26 accounts, consisting of 7 production/commodities accounts (large-scale agriculture, smallholder agriculture, mining, manufacturing, construction, electricity and water, and other services), 9 primary factors of production (four labour, three capital and two land categories), 7 institutions (enterprises, 5 household groups and government), investment and the rest of the world sectors, (Juana and Mabugu, 2005:346-349).

The 15 agricultural commodities and 24 activities accounts were aggregated into two activities/commodities accounts (large-scale and smallholder agriculture). The reason is that land transfer is predominantly from large-scale to smallholder agriculture. The manufacturing sector in the micro SAM, which consists of 6 commodities and 6 activities (grain milling, other food processing, textiles, other light manufacturing, fertilizer and agro-chemicals, and other manufacturing) were aggregated to a single manufacturing account. Similarly, the trade and transport and public and private services in the 1991 micro SAM were aggregated into one services account. The mining, electricity and construction accounts were retained as they are in the micro SAM.

The three primary factors identified in the micro SAM are labour, capital and land. For further factor analyses, labour is sub-divided into large scale unskilled labour, formal unskilled labour, informal small holder unskilled labour, and skilled labour. The skilled labour includes both agricultural and non-agricultural skilled workers. Large scale unskilled labour is predominantly made up of unskilled farm workers. Informal unskilled labourers are the smallholder farmers and the non-agriculture informal workers. The formal unskilled labourers are the unskilled workers who reside in urban areas (Juana and Mabugu, 2005).

Capital is sub-divided into large scale farm capital, smallholder farm capital, and non-agriculture capital, while land is sub-divided into large scale commercial land and smallholder land. The study assumes that land is predominantly used for agricultural activities. The two land sub-categories reflect the dualistic nature of agriculture in Zimbabwe. Hence, income accruing to large-scale land is large-scale agriculture income and that accruing to small-scale land is smallholder agriculture income. The sub-divisions help to ascertain the proportion of payments from the production sectors to each of the factor inputs. This assists policy makers/advisers to design policies that will stimulate higher economic growth and poverty reduction. Payments to factors of production go to households and institutions. For example payments to unskilled labour mostly go to poor rural households, while payments to capital go to enterprises owned by urban or rich households.

Three institutions are identified; enterprises, households and government. By assumption, government expenditure is exogenously determined. This has some impact on the production and total impact multipliers. There are five distinctive household groups; three rural and two urban. The three rural household groups are large scale owners/managers, large scale farm-workers and smallholders. These distinctions are made based on the socio-economic characteristics of the two farming systems. The two urban households

identified are urban high and low income households. This urban household distinction reflects the differences in the sources and levels of income. The 1997 household data provided by the Central Statistics Office in Zimbabwe was used to update the household accounts in the 1991 micro SAM. In addition to government, other exogenous accounts are investment accounts and the rest of the world.

3.2 The theoretical framework and the modelling procedure

The study computed the SAM multipliers using the material balance equation, which is explained developed by Sadoulet and De Janvry (1995) and Bautista *et al* (2002), and explained and used in Juana and Mabugu (2005). The basic materials balance equation can be specified as:

$$Y^l = AY^l + F \tag{1}$$

Where Y^l is an nx1 column vector of total sectoral output, A is an n x n matrix of direct technical coefficients for the endogenous factors and F is an nx1 column vector of final demand. The dimension of the 'A' matrix coincides with the number of productive sectors. Solving for Y^l from equation 1 leads to:

$$Y^l = (I - A)^{-1}F \tag{2}$$

Where 'I' is the identity matrix and $(I-A)^{-1}$ is the Leontief inverse. The input-output model is concerned with solving for the sectoral output levels (Y) that satisfy final demand for those outputs (F) given the inter-industry structure of production or the intermediate input requirements of the production sectors (A). The model is used to determine the production plan that is consistent with a desired final demand vector, given the inter-sectoral transactions matrix (A). The above equation can be used to derive various types of multipliers, the most common of which are the production and income multipliers. Equation 2 can be reduced to:

$$Y^l = M^l F \quad where\ M^l = (1 - A)^{-1} \tag{3}$$

Therefore, M^l is the input-output multiplier matrix, referred to in literature as the Leontief inverse. The vectors Y^l and F represent sectoral output and final demand respectively. Equation 3 can be used to calculate the endogenous incomes associated with any changes of the total exogenous accounts, given the multiplier matrix. It can also be used to analyze the effects on output arising from exogenous shocks, such as changes in investment or government expenditure or the rest of the world, that change final demand. Each cell in the

multiplier matrix M^l interprets the total income change in the row account induced by an exogenous income injection in the column account. With the production sectors, the multipliers indicate how a unit increase in the sector's production due to exogenous shocks stimulates economy-wide output growth.

Equation 3 can be extended to the SAM multiplier matrix by the inclusion of the primary factors and the consumption accounts to the production sectors. The inclusion of these accounts aim at incorporating the feedback from rents to consumption to new production that originates from an exogenous inflow. Let A_m be the enlarged square matrix of direct propensities computed from the SAM and M^s the enlarged inverse (SAM multiplier) matrix. Hence M^s can be computed as:

$$Y^s = M^s F, \ \ where\ M^s = (I - A_m)^{-1} \tag{4}$$

Equation 4 solves for the equilibrium level of all endogenous accounts which result from a shock or exogenous injections, given by changes in the elements of the exogenous accounts. The multiplier matrix M^s measures the direct and indirect impacts of the incorporated endogenous links and reduces to M^l when the dimension m of the A_m matrix corresponds to A (Boughanmi *et al*, 2002). The difference between M^s and M^l is due to the induced effect which is taken into account by M^s, but not by M^l.

Economic multipliers estimate the economy-wide impact of changing one variable on related variables in a specified economy, such as a state or a province, suggesting a strict cause-effect relationship (Tanjuakio *et al*, 1996). In this study, the model estimates the economy-wide impact of redistributing land from large-scale owners to smallholders.

Knowing the multiplier matrix $(1\text{-}A)^{-1}$ and the final demand for goods and services, the output level that satisfies the demand can be computed by multiplying the multiplier matrix by the final demand. That is;

$$(1 - A)^{-1} * F = Y^1 \tag{5}$$

Equation 5 is used to validate the computed multipliers and also shows the impact of exogenous shocks to the entries in the social accounting matrix on output, through its impact on the coefficient matrix, hence the multipliers. To capture the changes in output, subtract the former level of output before the shock, from the new level of output after the shock has been applied to the SAM. The difference shows the change in output resulting from the shock, which changes the level of intermediate demand in different ways for different

sectors, hence the different elements in the coefficient matrix. Algebraically, this is shown as:

$$(1-A_2)^{-1} * F - (1-A)^{-1} * F = [(1-A_2)-(1-A)] = \Delta Y^1 \quad (6)$$

Where A_2 represents the changes in the technical coefficients matrix that result from the shocks applied to the SAM. The technical coefficients change because the shocks lead a change in the input requirements. Equation 6 shows the change in output arising from changes in the entries due to policy implementation that lead to increases or decreases in intermediate input requirements.

3.3 Balancing the SAM

To verify that the SAM is balanced, three approaches were used:

i) For each account, the column total equals the row total;

ii) In the coefficient matrix, the column coefficients are each less than or equal to unity and each column's coefficients sum up to unity. A column coefficient is only equal to unity when that account is predominantly supplied or used by only one account. For example all large-scale land is predominantly owned by large-scale owner and used in large-scale agriculture. However, the equality of the sum of column coefficients to unity is still maintained. Table A1 in the appendix presents the calculated matrix of technical coefficients; and

iii) The product of the multiplier matrix and the final demand vector is equal to the column vector of the sectoral output.

The computed SAM multiplier matrix, which is presented on Table A2 in the appendix, was used to investigate the impact of changes in land ownership on output, value added and household income.

3.4 Simulations

The SAM entries are in million Zimbabwean Dollars, but the land transactions are reported in physical quantities like millions of hectares. The study therefore converted the land transfers into percentages and used these percentages to shock the SAM. Also, because transfer of land from large-scale to small-scale users meant transfer of land income from large-scale to smallholder agriculture, the shocks included the percentage transfer of land

and land income from large-scale to smallholders simultaneously. The shocks applied to the SAM are based on the following premises:

i) The post-independence government of Zimbabwe proposed a resettlement package for 162,000 farm families on 8.3 million hectares of land between 1980 and 1997.

ii) By the end of 1996 71,000 farm families were resettled on 3.6 million hectares of land and iii) the land area belonging to large-scale commercial farmers decreased from 14.8 million hectares in 1980 to 11.3 million hectares in 1997.

iii) It is assumed that the transferred land was the utilization portion of large-scale land holdings.

Based on the above premises the following shocks were therefore applied to the SAM:

Simulation I: If the proposed resettlement programme was successfully implemented, it would have implied that 8.3 million hectares of land was transferred from large-scale commercial to small-scale farmers. This quantity represents about 56 percent of large scale commercial farmland. In the SAM, this is equivalent to about Z$256.22 million worth of land transferred from large-scale commercial to small-scale farmers. In experiment I, Z$256.22 worth of land is transferred from large-scale land to small-scale land and the land equivalent land income from large-scale owner to smallholder households. For this experiment, the study assumes that large-scale commercial farmers are not compensated by government or the foreign sector with an equivalent amount.

Simulation II: Records show that by the end of 1997, 3.5 million hectares of land was actually transferred from large-scale commercial to the settlers, who are also smallholder farmers. This is equivalent to about 23 percent of the total land holdings of large-scale commercial farmers. This implies that in the SAM, Z$105.23 million worth of land was transferred from large-scale commercial farmers to smallholders. It is also assumed that the large-scale commercial farmers are not compensated with the monetary equivalent of land transferred. The experiment involves the transfer of Z$105.23 worth of land from large-scale to small-scale users.

Simulations III and IV: Repetition of experiments I and II respectively, with adequate compensation from government or the foreign sector to the large-scale farmers who willingly offer their land for re-sale. This was what the post-independent government of Zimbabwe, the former colonial masters and

interested non governmental organization agreed on in the Lancaster meeting. All the four simulations assumed that the transferred land was the utilizable portion of large-scale commercial farmland.

4. Presentation of results

This section presents and discusses the simulation results. The discussion mainly focuses on the possible impact of transfer of land from large-scale commercial farmers to smallholders on output, factor payments or value added and household income. These results are presented in Table 2. Columns 1, 2, 3 and 4 present the results of the experiments in absolute figures. These indicate absolute changes from the base figures, while on columns 5, 6, 7 and 8 present percentage changes from the base output, value added and household income.

4.1 Output

Rows 1 to 8 of Table 2 show the possible impact of land transfer from large-scale commercial farmers to smallholders for the different simulations or experiments. On aggregate, the results show that the transfer of land from large-scale to small-scale users without adequate compensation is likely lead to a decrease in output by Z$26.524 million under scenario I and Z$12.371 million under scenario II. In percentage terms, these figures represent a decrease of 0.022 percent and 0.01 percent respectively from the base output. On the other hand, with adequate compensation, aggregate output increases by Z$77.454 million and Z$43.713 million respectively for both scenarios III and IV. These changes represent an increase of 0.065 percent for scenario III and 0.037 percent for scenario IV.

However, the changes are different for the different sectors in the SAM. In all the four scenarios, output falls in the large-scale agricultural sector, though the magnitude of change is minimized with adequate compensation for large-scale land owners. The results also indicate that the manufacturing sector also experiences a possible decrease in output for all the four scenarios. Like the large-scale agricultural sector, the magnitude of the decrease decreases with adequate compensation for the large-scale land owners. The redistribution has a direct impact on the large-scale agriculture sector. But because of inter-sectoral linkages, the manufacturing sector is also negatively affected, through the multiplier (see row 4, column 1 on Table A2). Conversely, according to the results of the experiments, all the other sectors experience an increase in output, with the smallholder agriculture sector having a disproportionately larger share of the increase. This holds for all the four scenarios.

4.2 Gross value added

In literature gross value added is equal to output minus intermediate consumption. This represents payments to the factors of production, which include wages, rents on land and interest/profits on capital.

Overall, the results indicate that land redistribution from large-scale to smallholder farmers, with or without compensation, could possibly increase value added. However, the situation is different for each of the components of gross value added. The experimental results for the four labour categories and the aggregate impact on wages are shown in rows 9 to 13 of Table 2. On the aggregate, all the four experiments show that land transfer could lead to an increase in wages. Specifically, all the experimental results show that the wages of the informal smallholder unskilled labourers would increase with land transfer from large-scale to smallholder farmers, while the other categories' wages would only increases with adequate compensation for large-scale land owners.

As with labour, the results also show that land transfer without adequate compensation could lead to a significant decrease in gross interest/profit to large-scale capital. Conversely, the same experimental results show that interest on capital would significantly increase for small-scale capital. Specifically, the results of experiments I and II show that without compensation gross interest/profits could decrease by 0.095 and 0.047 percent respectively. With compensation, all the forms of capital and their aggregate, could receive increased interest/profits as shown in rows 14 to 17 of columns 3 and 4, and expressed in percentages in columns 7 and 8 of Table 2.

The experimental results also show the possible consequences of land redistribution on land rents. The possible consequences for large-scale and smallholder land and the aggregate situation for both categories are presented in rows 19, 20 and 21 respectively. On aggregate, the results indicate that land reform could increase the rent paid to land owners. The aggregate situation shows possible increase in rent by 2.466 percent, 1.444 percent, 1.868 percent and 0.742 percent for experiments I, II, III and IV respectively. However, the possible increase in land rent may be due to the increase in land rent to smallholder land, since the simulation results show that for each of the four experiments large-scale land-rent decreases. The aggregate situation suggests that, though large-scale land rent decreases, the increase in smallholder land rent could be higher than the decrease in the former, hence, an overall net increase in land rent.

Table 2: The impact of land reform policies on output, factor payments and income generation in Zimbabwe

	Scenario I: Absoulte change (1)	Scenario II: Absolute change (2)	Scenario III: Absolute change (2)	Scenrio IV: Absolute change (4)	Scenario I: Percentage change from base (5)	Scenarion II: Percentage Change from base (6)	Scenario III: Percentage change from base (7)	Scenario IV: Percentage change from base (8)
LS Agriculture(1)	-121.094	-78.341	-46.461	-18.903	-1.322	-0.855	-0.507	-0.206
SH Agriculture (2)	151.838	97.583	148.438	60.349	3.253	2.091	3.180	1.293
Mining(3)	4.199	2.562	3.540	1.438	0.095	0.058	0.080	0.032
Manufacturing(4)	-85.882	-52.061	-71.010	-28.850	-0.189	-0.114	-0.156	-0.063
Electricity(5)	4.354	2.661	3.685	1.499	0.204	0.124	0.172	0.070
Construction(6)	0.925	0.593	0.897	0.365	0.015	0.009	0.014	0.006
Services(7)	19.136	14.631	38.365	27.814	0.041	0.032	0.083	0.060
AGGREGATE (8)	**-26.524**	**-12.371**	**77.454**	**43.713**	**-0.022**	**-0.010**	**0.065**	**0.037**
LSU Workers(9)	-2.040	-1.229	1.652	0.672	-2.047	-1.233	1.657	0.674
Formal U Workers (10)	-1.125	0.709	1.042	0.424	-0.150	0.094	0.139	0.056
Inf. SHU Workers (11)	20.997	12.241	15.320	6.232	0.964	0.562	0.704	0.286
Skilled Workers (12)	-8.962	-3.679	24.426	9.937	-0.091	-0.037	0.249	0.101
AGGREGATE (13)	**8.870**	**8.042**	**42.439**	**17.265**	**0.069**	**0.063**	**0.330**	**0.134**
LS Capital (14)	-36.912	-22.058	29.152	11.864	-2.147	-1.283	1.696	0.690
SH Capital (15)	17.106	12.098	4.999	2.034	6.578	4.652	1.922	0.782
Other Capital (16)	7.566	3.941	15.727	6.394	0.070	0.036	0.145	0.059
AGGREGATE (17)	**-12.240**	**-6.019**	**49.878**	**20.292**	**-0.095**	**-0.047**	**0.388**	**0.158**
LS Land (18)	-97.237	-100.515	-252.792	-102.765	-21.253	-21.969	-55.251	-22.461
SH Land (19)	111.896	109.097	263.895	107.175	81.794	79.748	192.903	78.343
AGGREGATE (20)	**14.659**	**8.581**	**11.103**	**4.410**	2.466	1.444	1.868	0.742
Total Value Added (21)	**11.288**	**34.422**	**103.421**	**41.967**	**0.043**	**0.131**	**0.393**	**0.160**
LS Owner/Manager (22)	-251.759	-154.147	-214.432	-87.157	-2.722	-1.666	-2.318	-0.942
LS Farm-workers (23)	-2.040	-1.229	-1.652	-0.672	-2.047	-1.233	-1.657	-0.674
SH Households (24)	328.899	200.044	274.803	121.613	17.983	10.938	15.025	6.103
Urban High Income (25)	-31.301	-19.167	6.649	4.840	-0.252	-0.155	0.054	0.039
Urban Low Income (26)	15.567	9.137	11.612	4.724	0.603	0.354	0.450	0.183
AGGREGATE (27)	**59.365**	**34.638**	**76.980**	**43.348**	**0.227**	**0.132**	**0.294**	**0.167**

Source: Extracted from the simulation results.

4.3 Household income generation

The major aim of the land re-settlement programme was to redress the high income inequity between predominantly white commercial farmers and the peasant smallholders or the landless, the majority of whom live in rural areas.

The results of the first experiment show an increase of Z$59:365 million, which represents an increase of about 0.227 percent from the base household income. However, while the results show a substantial increase in smallholder households' income, it at the same time indicates a decrease in the incomes of large-scale land owners, large-scale farm-workers and urban high income households, but the increase in the former is more than the decrease in the latter household groups, hence, a positive net increase in households' aggregate income. The second, third and fourth experiments also yield a similar pattern of results, but with decreased negative impact on the incomes of large-scale owners and large-scale farm-worker households.

Specific details of the impact of land redistribution on households' income are presented in rows 23 to 28 of Table 2. Generally, the results show that while land redistribution could lead to a net increase in households' income, it leads to a decrease in the incomes of large-scale owner households. Nonetheless, the decrease in large-scale owner households, income could be adequately compensated by the increase in smallholder households' income.

5. Summary, conclusions and recommendations

This study quantitatively investigated the impact land reform polices in Zimbabwe could have on output, gross value added and households' income in the country. It looked at welfare and equity issues that could possibly be addressed by land reform, specifically in favour of the rural poor farmers in post-independence Zimbabwe. The study used the 1991 social accounting matrix for Zimbabwe, which was updated by the 1998 household survey data provided by the Central Statistics Office of Zimbabwe. Information on the transfer of land was extracted from records of the deeds registries in Harare and Bulawayo. Using these data sources, the study computed the SAM multipliers and simulated the impact of land transfers on output, gross value added and households' income. The simulations were based on four different scenarios.

From the simulations results, it can be argued that land reform in Zimbabwe:

i) Can only increase output if the losers are adequately compensated. In the scenarios where the large-scale land owners are not compensated, the

results show a decrease in output. In the last two experiments, where the large-scale land owners are assumed to be adequately compensated, the results show a general increase in output. However, whether compensated or not, the results indicate a decrease in output for the large-scale agriculture sector and an increase for the smallholder agriculture sector. With adequate compensation, the total decrease in output of the negatively impacted sectors will be less than the increase in output of the positively impacted sectors, leading to a net increase.

ii) Can lead to a net increase in gross value added. All the four experiments show that land redistribution has the possible impact of increasing gross value added, though the scenario results indicate differences in the net effect for the different components of value added. Both the labour and capital components of value added show a net decrease in value added without compensation and a positive net increase with compensation, while land shows a net increase for all the four scenarios, though rent on large-scale land decreases in each of the four scenarios.

iii) Has the potential of increasing households' income. The results of all the four experiments show a net increase in households' income, though this has a negative impact on the incomes of large-scale owner households. These results indicate that, while the incomes of large-scale owner households are likely to decrease with land reforms in Zimbabwe, the possible increase in the incomes of smallholder households is likely to outweigh the decrease in the incomes of the former, which leads to a net increase in households' income. Therefore, land reform has the potential of improving households' welfare according to the welfare compensation criterion. That is, those who gain from the programme can adequately compensate the losers and still have some net gains.

Based on the above findings, the study generally concludes that, if the land reform programme in Zimbabwe is properly planned and cautiously implemented, it can potentially increase output and gross value added and redistribute income from large-scale owner households to smallholder households, hence could be generally beneficial for the economy of Zimbabwe. For these benefits to be desirable for the whole economy, the study shows that measures should be taken to adequately compensate the large-scale land owners, whose land is transferred to smallholders.

Generally, the land reform programme encountered some significant problems between 1980 and 1997, which made the economy-wide benefits far less than the potential benefits shown by the simulation results of the study. The

following were the major problems and setbacks that inhibited the efficient and successful implementation of the land reform programme in Zimbabwe:

i) Most large scale commercial farmers were unwilling to sell the productive areas of their land. What they offered for sale to the government or on the open market were marginal areas that were less productive. These were also sold at high prices, thereby deliberately pricing out the most vulnerable and poor (Rugube and Chambati, 2001; Lebert, 2003). This means that willing-seller-willing-buyer framework for redistribution did not work well to achieve the objectives of land resettlement.

ii) In the implementation process, government acquired land was often given to government stalwarts and corrupt government officials, thereby reducing the chances of the most vulnerable to benefit from the programme (Rugube and Chambati, 2001).

The study therefore recommends that to successfully implement the land reform programme and to gain economy-wide benefits, the large-scale farmers who offer their land must be adequately compensated and that a more transparent and coordinated institutional structure is instituted to enhance stakeholder participation in the redistribution process. The involvement of all the stakeholders in planning and implementing land reform is crucial for the realization of the potential benefits of land reform.

The scope of the current study is limited to the economy-wide analysis of land reforms in Zimbabwe. There is still the need to investigate the specific benefits derived from land reform in specific economic activities, such as small-scale cotton and tobacco farmers. There is also the need to investigate how the potential benefits of land reforms are distributed when jointly implemented with other macro-policies such as the removal of subsidies and tariffs and increasing or decreasing land tax.

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This work is original and is not considered for publication in any other journal. All expressions and grammatical and computational errors in this paper are the responsibility of the author.

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Appendix A

Table A1: Coefficient Matrix for the 1991 Zimbabwe SAM

	LS Agric	SH Agric	Mining	Manu-facturing	Electricity & Water	Construction	Services
LS Agric	0.2376	0.0025	0.0000	0.0593	0.0000	0.0000	0.0021
SH Agric	0.4347	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mining	0.0000	0.0000	0.4751	0.0222	0.0191	0.0424	0.0026
Manufacturing	0.0689	0.1454	0.1302	0.4400	0.0273	0.2506	0.0998
Electricity	0.0043	0.0078	0.0107	0.0020	0.5873	0.0016	0.0007
Construction	0.0000	0.0000	0.0000	0.0006	0.0000	0.5172	0.0057
Services	0.1510	0.1280	0.0696	0.1068	0.0117	0.0354	0.5979
LSU Workers	0.0037	0.0141	0.0000	0.0000	0.0000	0.0000	0.0000
Formal U Workers	0.0000	0.0000	0.0080	0.0042	0.0116	0.0080	0.0097
Informal SHU Workers	0.0000	0.1466	0.0000	0.0079	0.0000	0.0084	0.0234
Skilled Workers	0.0147	0.1117	0.0736	0.0445	0.1018	0.0805	0.1317
LS Capital	0.0546	0.2613	0.0000	0.0000	0.0000	0.0000	0.0000
SH Capital	0.0000	0.0557	0.0000	0.0000	0.0000	0.0000	0.0000
Other Capital	0.0000	0.0000	0.1848	0.1003	0.2139	0.0306	0.1043
LS Land	0.0085	0.0578	0.0000	0.0000	0.0000	0.0000	0.0000
SH Land	0.0027	0.0475	0.0000	0.0000	0.0000	0.0000	0.0000
Firms	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Owner/Manager	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Farm-workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Households	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Urban High Income	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Urban Low Income	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Government	0.0139	0.0217	0.0255	0.0486	0.0273	0.0251	0.0123
Investment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rest of the world	0.0052	0.0000	0.0225	0.1637	0.0000	0.0000	0.0097
	1.0000	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**

Table A1 Cont: Coefficient Matrix for the 1991 Zimbabwe SAM

	LSU Workers	FU Workers	ISHU Workers	Skilled Workers	LS Capital	SH Capital	Other Capital
LS Agric	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Agric	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mining	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Manufacturing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Construction	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Services	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LSU Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Formal U Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Informal SHU Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Skilled Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Capital	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Capital	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Capital	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Land	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Land	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Firms	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9883
LS Owner/Manager	0.0000	0.0000	0.0000	0.0825	1.0000	0.0000	0.0000
LS Farm-workers	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Households	0.0000	0.0000	0.3220	0.0000	0.0000	1.0000	0.0000
Urban High Income	0.0000	0.0000	0.0000	0.9148	0.0000	0.0000	0.0000
Urban Low Income	0.0000	1.0000	0.6780	0.0000	0.0000	0.0000	0.0117
Government	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Investment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rest of the world	0.0000	0.0000	0.0000	0.0026	0.0000	0.0000	0.0000
	1.0000	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**

Table A1 Cont: Coefficient Matrix for the 1991 Zimbabwe SAM

	Large-scale land	**Smallholder land**	**Firms**	**LS Owner/ Manager**	**LS Farm workers**	**SH Households**	**Urban High Income**
LS Agric	0.0000	0.0000	0.0000	0.0457	0.3480	0.0868	0.0148
SH Agric	0.0000	0.0000	0.0000	0.0000	0.0000	0.3745	0.0000
Mining	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Manufacturing	0.0000	0.0000	0.0000	0.4900	0.5478	0.3547	0.4807
Electricity	0.0000	0.0000	0.0000	0.0123	0.0083	0.0057	0.0328
Construction	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Services	0.0000	0.0000	0.0000	0.2324	0.0765	0.1289	0.1985
LSU Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Formal U Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Informal SHU Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Skilled Workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Capital	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Capital	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Capital	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Land	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Land	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Firms	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LS Owner/Manager	1.0000	0.0000	0.4627	0.0000	0.0000	0.0000	0.0000
LS Farm-workers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SH Households	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0064
Urban High Income	0.0000	0.0000	0.2768	0.0000	0.0000	0.0000	0.0000
Urban Low Income	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Government	0.0000	0.0000	0.1396	0.0744	0.0000	0.0115	0.1000
Investment	0.0000	0.0000	0.0760	0.1452	0.0193	0.0379	0.1668
Rest of the world	0.0000	0.0000	0.0448	0.0000	0.0000	0.0000	0.0000
	1.0000	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**

Table A1 Cont: Coefficient Matrix for the 1991 Zimbabwe SAM

	Urban Low Income	**Government**	**Investment**	**Rest of the world**
LS Agric	0.1709	0.0000	-0.0059	0.3284
SH Agric	0.0000	0.0000	0.0000	0.0000
Mining	0.0000	0.0000	0.0000	0.0986
Manufacturing	0.4987	0.0215	0.5658	0.1798
Electricity	0.0271	0.0014	0.0000	0.0000
Construction	0.0000	0.0000	0.5423	0.0000
Services	0.1096	0.3082	0.0000	0.1770
LSU Workers	0.0000	0.0000	0.0000	0.0000
Formal U Workers	0.0000	0.0000	0.0000	0.0000
Informal SHU Workers	0.0000	0.0000	0.0000	0.0000
Skilled Workers	0.0000	0.0000	0.0000	0.0000
LS Capital	0.0000	0.0000	0.0000	0.0000
SH Capital	0.0000	0.0000	0.0000	0.0000
Other Capital	0.0000	0.0000	0.0000	0.0000
LS Land	0.0000	0.0000	0.0000	0.0000
SH Land	0.0000	0.0000	0.0000	0.0000
Firms	0.0000	0.0838	0.0000	0.0000
LS Owner/Manager	0.0000	0.0440	0.0000	0.0113
LS Farm-workers	0.0000	0.0000	0.0000	0.0000
SH Households	0.0693	0.0331	0.0000	0.0000
Urban High Income	0.0000	0.0074	0.0000	0.0000
Urban Low Income	0.0000	0.0166	0.0000	0.0000
Government	0.0428	0.4899	0.0000	0.0322
Investment	0.0816	-0.0349	-0.1022	0.1727
Rest of the world	0.0000	0.0290	0.0000	0.0000
	1.0000	**1.0000**	**1.0000**	**1.0000**

Table A2: The SAM Multipliers

	LS Agric	SH Agric	Mining	Manu-facturing	Electricity & Water	Construction	Services
LS Agric	1.591	0.303	0.212	0.286	0.202	0.250	0.244
SH Agric	0.742	1.205	0.108	0.141	0.103	0.128	0.131
Mining	0.107	0.107	1.997	0.135	0.168	0.278	0.110
Manufacturing	2.112	2.148	1.838	2.929	1.627	2.320	1.975
Electricity	0.126	0.126	0.138	0.078	2.521	0.103	0.107
Construction	0.028	0.025	0.021	0.020	0.018	2.093	0.048
Services	2.161	1.896	1.552	1.405	1.327	1.543	3.840
LSU Workers	0.017	0.004	0.002	0.003	0.002	0.003	0.003
Formal U Workers	0.033	0.029	0.041	0.028	0.050	0.045	0.048
Informal SHU Workers	0.146	0.700	0.067	0.075	0.059	0.091	0.128
Skilled Workers	0.516	0.384	0.464	0.355	0.532	0.524	0.634
LS Capital	0.300	0.077	0.040	0.054	0.038	0.045	0.046
SH Capital	0.030	0.243	0.006	0.007	0.006	0.007	0.008
Other Capital	0.485	0.459	0.745	0.483	0.873	0.531	0.643
LS Land	0.079	0.020	0.011	0.014	0.010	0.013	0.012
SH Land	0.016	0.128	0.003	0.004	0.003	0.004	0.004
Firms	0.479	0.455	0.737	0.477	0.863	0.525	0.636
LS Owner/Manager	0.619	0.679	0.430	0.316	0.491	0.346	0.407
LS Farm-workers	0.016	0.018	0.002	0.003	0.002	0.003	0.003
SH Households	0.135	0.197	0.041	0.046	0.039	0.052	0.066
Urban High Income	0.597	0.590	0.628	0.457	0.726	0.624	0.757
Urban Low Income	0.158	0.197	0.095	0.086	0.101	0.113	0.140
SAM production multiplier	**6.868**	**5.810**	**5.866**	**4.994**	**5.967**	**6.714**	**6.454**
Total SAM impact multiplier	**10.508**	**9.729**	**9.177**	**7.403**	**9.761**	**9.641**	**9.987**

Table A2 Cont: The SAM Multipliers

	LSU Workers	FU Workers	ISHU Workers	Skilled Workers	LS Capital	SH Capital	Other Capital	LS Land	SH Land
LS Agric	0.731	0.473	0.445	0.222	0.272	0.386	0.190	0.272	0.386
SH Agric	0.347	0.255	0.361	0.114	0.135	0.583	0.095	0.135	0.583
Mining	0.121	0.110	0.111	0.095	0.099	0.112	0.072	0.099	0.112
Manufacturing	2.504	2.241	2.257	1.903	2.011	2.291	1.465	2.011	2.291
Electricity	0.116	0.149	0.138	0.140	0.100	0.114	0.087	0.100	0.114
Construction	0.025	0.022	0.023	0.021	0.023	0.025	0.016	0.023	0.025
Services	1.826	1.658	1.736	1.535	1.696	1.898	1.212	1.696	1.898
LSU Workers	1.008	0.005	0.007	0.002	0.003	0.010	0.002	0.003	0.010
Formal U Workers	0.031	1.028	0.029	0.025	0.027	0.031	0.020	0.027	0.031
Inf SHU Workers	0.113	0.094	1.111	0.068	0.075	0.148	0.054	0.075	0.148
Skilled Workers	0.424	0.378	0.400	1.326	0.351	0.445	0.254	0.351	0.445
LS Capital	0.130	0.092	0.119	0.042	1.050	0.173	0.035	0.050	0.173
SH Capital	0.019	0.014	0.020	0.006	0.008	1.033	0.005	0.008	0.033
Other Capital	0.490	0.451	0.458	0.399	0.419	0.474	1.306	0.419	0.474
LS Land	0.035	0.025	0.032	0.011	0.013	0.049	0.009	1.013	0.049
SH Land	0.010	0.007	0.011	0.003	0.004	0.017	0.003	0.004	1.017
Firms	0.484	0.445	0.453	0.395	0.414	0.468	1.291	0.414	0.468
LS Owner/Manager	0.424	0.354	0.393	0.345	1.284	0.476	0.663	1.284	0.476
L.S Farm-workers	1.008	0.005	0.007	0.002	0.003	0.010	0.002	0.003	0.010
SH Households	0.077	0.131	0.446	0.045	0.044	1.110	0.034	0.044	1.110
Urban High Income	0.522	0.470	0.491	1.322	0.436	0.536	0.589	0.436	0.536
Urban Low Income	0.113	1.097	0.788	0.076	0.083	0.137	0.072	0.083	0.137
Total impact multiplier	**10.558**	**9.507**	**9.835**	**8.098**	**8.549**	**10.525**	**7.476**	**8.549**	**10.525**

Table A2 Cont: The SAM Multipliers

	Firms	LS Owner/ Manager	LS Farm Worker	SH H/holds	Urban High Income	Urban Low Income
LS Agric	0.186	0.272	0.731	0.386	0.218	0.473
SH Agric	0.093	0.135	0.347	0.583	0.112	0.255
Mining	0.072	0.099	0.121	0.112	0.095	0.110
Manufacturing	1.456	2.011	2.504	2.291	1.899	2.241
Electricity	0.086	0.100	0.116	0.114	0.144	0.149
Construction	0.016	0.023	0.025	0.025	0.020	0.022
Services	1.207	1.696	1.826	1.898	1.525	1.658
LSU Workers	0.002	0.003	0.008	0.010	0.002	0.005
Formal U Workers	0.020	0.027	0.031	0.031	0.025	0.028
Informal SHU Workers	0.054	0.075	0.113	0.148	0.067	0.094
Skilled Workers	0.252	0.351	0.424	0.445	0.324	0.378
LS Capital	0.035	0.050	0.130	0.173	0.041	0.092
SH Capital	0.005	0.008	0.019	0.033	0.006	0.014
Other Capital	0.304	0.419	0.490	0.474	0.399	0.451
LS Land	0.009	0.013	0.035	0.049	0.011	0.025
SH Land	0.003	0.004	0.010	0.017	0.003	0.007
Firms	1.301	0.414	0.484	0.468	0.394	0.445
LS Owner/Manager	0.666	1.284	0.424	0.476	0.261	0.354
LS Farm-workers	0.002	0.003	1.008	0.010	0.002	0.005
SH Households	0.033	0.044	0.077	1.110	0.045	0.131
Urban High Income	0.591	0.436	0.522	0.536	1.406	0.470
Urban Low Income	0.059	0.083	0.113	0.137	0.076	1.097
Total impact multiplier	**6.452**	**7.549**	**9.558**	**9.525**	**7.078**	**8.507**