Modelling the impact of the 'Fast Track' land reform policy on Zimbabwe's maize sector

By

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Abstract

This paper attempts to analyse the impacts of the 'fast track' land reform policy on maize production in Zimbabwe through the construction of a partial equilibrium model that depicts what could have happened if no further policy shifts had taken place after 2000. The re-simulated baseline model was used to make projections based on the various trends of exogenous variables in 2000. This means that the model generated an artificial data set based on what the maize market would have looked like under a set of the pre-2000 existent policy conditions. The 'fast track' land reform policy was thus assessed based on the performance of the baseline model using a range of "what if" assumptions. Commercial area harvested was 39 % less than what could have been harvested in 2001, and declining by negative 80.57 % in 2007. Results showed total maize production was 61.85 % and 43.88 % less than what could have been produced in the 2002 and 2005 droughts, respectively. This may imply that droughts would have been less severe if the 'fast track' land reform was not implemented. Therefore, the 'fast track' land reform had a negative effect on maize

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production. Thus, the econometric model system developed provided a basis through which the effects of the FTLRP on the maize market may be analysed and understood.

Key Words: ‘fast track’ land reform programme, partial equilibrium model, maize, Zimbabwe

1. Introduction

Over the past four decades, both domestic and trade policy interventions within Zimbabwe's agricultural sector have occurred within the context of vast political and socioeconomic change. Key developments in Zimbabwe's agricultural markets which define its dramatic transformation over the last forty years have been marked by three main shifts. Firstly, maize production has shifted in terms of sectoral contributions, with the communal sector's contribution to total output growing to an average of 60 % as the commercial farmers diversified into export production (Jayne *et al.*, 1994; Jenrich, 2008; Andersson, 2007). Secondly, the marketing of grain was transformed from a controlled system to a relatively free market dispensation during the 1990s. This was followed by a re-introduction of price controls and marketing restrictions from 2001 to 2008 and, more recently, a shift back to free markets operating under a multi-currency system. Thirdly, with more profound implications, was a 'fast track' land reform policy that led to the expropriation of approximately 4 000 commercial farms from 2001 to present (Richardson, 2006; Moyo, 2006; Moyo and Yeros, 2009). While this snapshot reflects that the agricultural policy environment and the structure of production and marketing have changed tremendously, an important question is what are the implications and impacts of such changes on Zimbabwe's agricultural sector.

As such, the broader changing economic and political landscape within which agricultural production and marketing takes place warrants a greater need to understand how the policy environment impinges on the supply and demand of grain. Looking at the food crisis in context, there is now a greater need to continuously assess implications of the policy decisions concerning pricing, distribution, production and grain market structure. This process would facilitate the understanding and timely application of strategic information on grain market supply and demand which could enable the adoption of effective decisions and marketing strategies. In addition, it is crucial to develop a more efficient grain market if the country's food security status is to be improved, and this can be achieved, in part, by a prognosis of baseline projections and market outlooks that can assist government in taking remedial action to correct current market inadequacies.

1.1 Research Problem

Over the past decade, Zimbabwe has been facing acute and persistent maize shortages. Between 5.2 million and 7.2 million people in Zimbabwe have been in either chronic or transient food insecurity, or both, since 2001 (Zimbabwe Emergency Food Security Assessment Report, 2002; Human Rights Watch Group, 2003; Famine Early Warning Systems Network (FEWSNET), 2008). This has led to substantial emergency grain imports and food aid that have amounted to a cumulative expenditure of US$ 2.8 billion since 2001 (Cross, 2008).

The persistence, scale and scope of Zimbabwe's food crisis reflect that the changes that have occurred in the maize sector over time have not been well understood by policy makers. It is against recurrent maize shortages that the sector be carefully assessed in order to understand the impact of particular policy shifts in the maize market. A landmark shift in policy that has inevitably affected the maize sector is the 'fast track' land reform policy. A prevailing rationale suggests that the unprecedented maize shortfalls have, to a fair extent, been triggered by the 'fast track' land reform policy implemented in 2001 (Richardson, 2007a; Richardson, 2007b). However, analysing the effect of the 'fast track' land reform on the maize market is complex, not least because of a combination of other policy factors that have also been on-going, but also due to the fact that Zimbabwe experienced droughts in 2002 and 2005 (Andersson, 2007). Therefore, attributing maize shortages to the 'fast track' land reform policy, given the susceptibility of the market to droughts, remains debatable.

The complex nature of the interface between 'fast track' land reforms and food production implies that the production impact of Zimbabwe's 'fast track' land reform policy should be carefully placed within the scope of agricultural market performance. In this study, a partial equilibrium model is constructed in an attempt to give an elaborate link between the 'fast track' land reform policy and maize supply and demand within a specific context and market setting. This empirical approach to land reform analysis may allow the reader to reason that the model's baseline or 'would be' outcomes against actual 'fast track' land reform outcomes could be the impact of the 'fast track' land reform.

2. Background

Industry experts attribute maize production shortfalls in preceding seasons as well as the 2009/10 production season to a myriad of farm-level challenges emanating from policy and non-policy factors. These include a lack of adequate funding, agricultural input shortages and limited commercial farming skills. Yet, given enough support through strategic and timely interventions under stable institutional, economic and political conditions such as those that existed before 2000, Zimbabwe's agricultural sector may realise substantial increases in productivity. This is argued since research has established that output per hectare increases with reduced farm size in all natural regions of Zimbabwe (Elich, 2005).

However, Richardson (2004) and Richardson (2006) argued that the land redistribution of 2001 did not achieve the expected increases in production, pointing out the 'tragedy of the commons' associated with the land reform policy's failure to uphold private property rights as a key factor. Moreover, the indiscriminate seizure of commercial farmland broke the structural link between the communal and commercial farming sectors, which had symbiotically benefited communal farmers in terms of subsidised fertilizers, inputs, low-interest loans and foreign exchange generation for the agricultural sector (Richardson, 2007a). It is against this background that the 'fast track' land policy is argued as the cause of maize production shortfalls.

In light of this widely-shared opprobrium, an obvious and yet urgent question is the extent of the 'fast track' land reform policy's impact on the maize sector. Although Richardson (2007b) questions what would have happened if the 'fast track' land reform had not been implemented, Andersson (2007) purports that the argument by Richardson (2007a) was not coherent. Nonetheless, it is Richardson's (2007a) line of reasoning that forms the thrust of the argument that this study seeks to further comprehend. Even though considerable debate has erupted over the appropriation of the 'fast track' land programme as a cause of agricultural production shortfalls, the study will not focus on this debate but will rather build its argument on how much Zimbabwe could have produced had government not implemented the 'fast track' land reform programme.

The cascade of effects of the expropriation of commercial farms under the 'fast track' land reform and the subsequent poor agricultural market performance suggest that the paradox of Zimbabwe's food crisis needs to be unpacked further. Drawing from and building on Richardson's (2007b) argument, the question is: would the drop in agricultural production have been less severe if 'fast track' land reforms had not taken place? This question needs to be treated very carefully because the effects of the loss of property rights under the land reform occurred within the context of a complex and dynamic maize market that also experienced two droughts in the space of three years. Naturally, maize markets would take time to recover from such phenomenal natural disasters. In this study, a sound understanding of Zimbabwe's grain trade, marketing and pricing is used in the critical design of the partial equilibrium model that will allow a line to be drawn on the 'fast track' land reform impacts.

3. Maize Trade, Marketing and Pricing Policy in Zimbabwe

Zimbabwe's maize market was a net exporting sector that was underpinned by price, market policy and weather. Historically, the maize sector was typified by an epoch of interventionist market policies. This market system entailed a Grain Marketing Board (GMB) administered and fixed pricing system based on a pan-seasonal and pan territorial framework (Muir & Muchopa, 2006). Whilst a 'pseudo free market' existed during the 1990's as part of a general move towards a more market-oriented development approach, the grain market performance during this period however reflected not the impacts of 'liberalized markets', but rather a mixed policy environment of legalised private grain trade within the context of highly interventionist government operations in the grain market (The Food Security Group, 2008). This implied that instead of purchasing the entire marketed surplus as was the objective during the initial control period, the GMB attempted to manipulate maize market prices through purchase and sale operations, ostensibly for food security and/or price stabilization purposes (ibid). Within this framework, the determination of domestic maize prices was based on policy that would be informed by import parity price trends in the domestic and regional maize markets. Thus, policy set the ceiling price at the import parity price and floor price at the export parity price respectively, with the price band reflecting market fundamentals within which private grain trade regimes operate (Mano, 2003).

However, important to note is that Zimbabwe's maize equilibrium prices seldom occurred strictly according to these policy prescriptions. An influence of the government negotiations with Commercial Farmer's Union (CFU) lobby efforts, and more significantly, factored considerations of GMB's maize forecasts, state of the trading account projections showing stock levels, expected purchases and sales income, transport, handling and storage costs meant that the pricing framework remained fairly complex (Takavarasha, 1994). This sentiment is implicitly reflected in the figure 1 below:

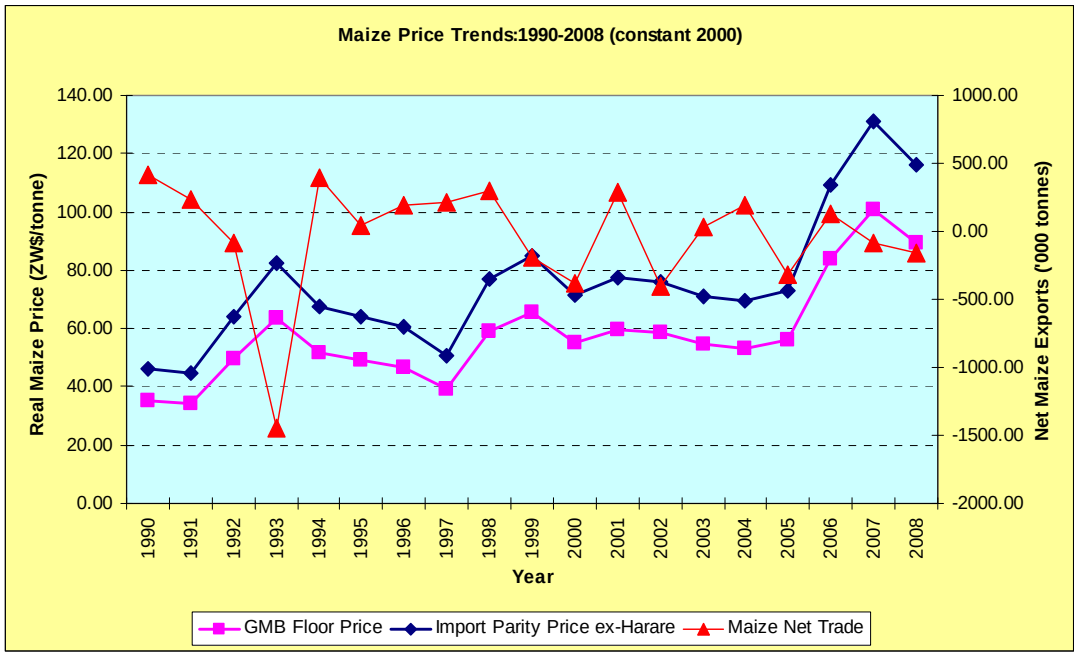

Figure 1: Maize Price Trends

Source: Data Adapted from Agricultural Statistical Bulletin (2008),

As shown in figure 1 above, real maize price for most years fluctuated around the export parity regime, with high production and exports keeping prices relatively lower. Prices in this case, also seemed to be determined by adverse weather conditions, domestic food self sufficiency and the net trade position, which was highly positive in most years. The sharp drop in the net trade in 1993, as an after-effect of the devastating 1992 drought saw only a marginal increase in price, this reflecting responses of implicit government intervention through purchase and sale operations in the market that kept prices at low levels. In light of the relatively complex nature of Board operations and other exogenous forces acting on the maize market, Valdes & Muir-Leresche (1993) deduced a simplified price equation in which

the producer price of maize was an additive function of GMB lagged ending stocks and lagged producer prices. They expressed this equation mathematically as:

Equation 1 $P_t = b + b_0(ENDSTOCK_{t-1}) + b_1 P_{t-1}$

In equation 1, P_t represents the current GMB maize producer price, $ENDSTOCK_{t-1}$ represents the lagged closing stock and P_{t-1} represents the lagged producer prices. According to this equation, government's maize prices were determined by previous year's prices and available stocks at the end of the season.

However, this equation may be overly simplified, not capturing the influence of the regional markets on domestic prices, and therefore the salient market features that sufficiently depict the influence of maize trade and policy. Given the fact that markets fluctuated around the export parity prices (as shown in figure 1), this suggests that parity prices may have been somewhat correlated with domestic prices. Industry experts argue that under structural market adjustments, maize trade was driven by regional prices, adverse weather conditions, location, and to some extent arbitrage opportunities. From this perspective, it may thus be plausible to model the domestic price as a function of the parity prices, although domestic prices would be regarded in this case as predetermined in the domestic market system. The exchange rate is factored into the domestic prices, and linked to regional maize prices to reflect the influence of the regional markets on the domestic prices.

4. The Analytical Model

Given the relatively complex nature of price determination and the influence of other trade and policy factors that impact on domestic maize markets, partial equilibrium modelling becomes a uniquely useful way of analysing Zimbabwe's maize sector.

The strength of partial equilibrium modelling as a way of understanding the Zimbabwean maize market rests in several of its strengths. Firstly, using partial equilibrium analysis is empirically simple and the analysis thereof reasonably approximates the general effects of trade policy changes where weak links between commodities and their supplier or output

sectors may exist (Perali, 2003). Secondly, partial equilibrium analysis provides useful information on the impact of trade and policy changes at very detailed product and sectoral levels, hence allowing for the utilization of widely available trade data (Lang, 2006; Thurlow *et al*., 2005; Wubehen, 2006). To add, the process of regional and global integration presents far reaching implications for the domestic farming sector and the related supply and marketing issues in the economy, making partial equilibrium models a uniquely significant way of presenting the integrated nature of local, regional and world agricultural markets (Meyer, 2005).

Thus, from a partial equilibrium perspective, Zimbabwe's maize market can be conceptually illustrated as shown in figure 2 below. The illustration below depicts that Zimbabwe's domestic prices are influenced by regional price trends. This goes along the opinion of industry experts and scholars such as Takavarasha (1994), who argued that Zimbabwe's maize markets since the 1980's were influenced by regional parity price trends that informed price negotiations, in addition to weather issues. In this case, prices are modelled as a function of parity prices as discussed, and net trade is thus used to close the model in the form of an identity equation.

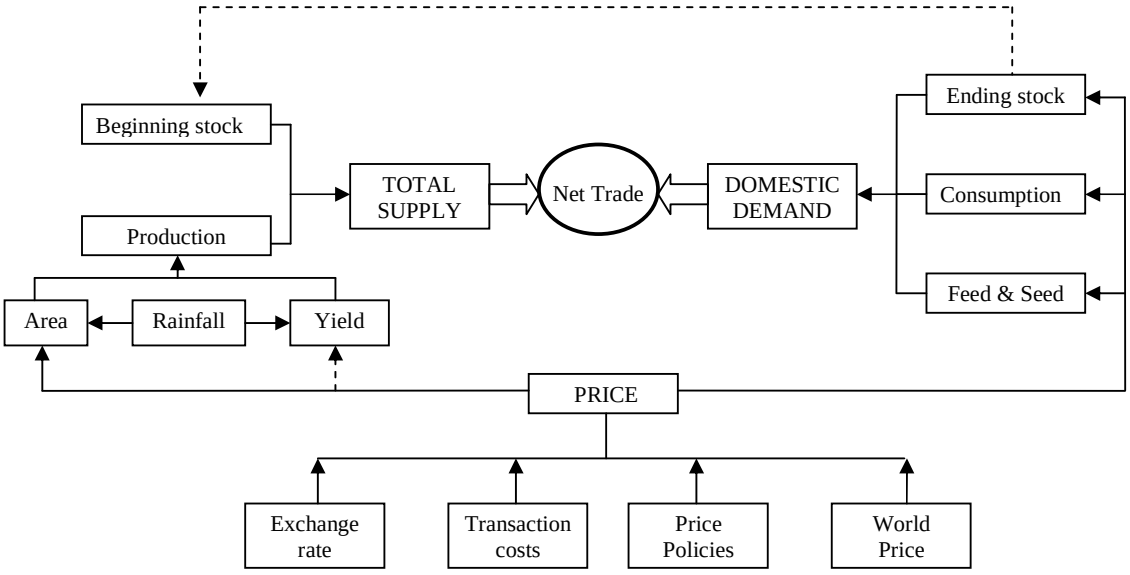

Figure 2: Diagram illustrating Zimbabwe's maize market model

Source: Adapted from Meyer *et al*., (2006)

Now, a typical partial equilibrium model, as outlined in figure 2 above, consists of domestic supply, demand, trade and price components. The components of the model contain a set of simultaneous equations which solve for an equilibrium price in the maize market. In the sub-sections below, each component is discussed in detail.

4.1 The Supply Component

Begging stock and production make up the maize supply component. Beginning stocks in period *t* are taken as ending stock in period *t-1* and this lagged relationship is illustrated by the dotted line in figure 2. Production is made up of area and yield, and area in this case is modelled as follows:

Equation 2 $$AREA_t = f(AREA_{t-1}, P^m_{t-1}, P^m_t, P^s_t P^i_t, RAIN, G)$$

From this equation, farmers' current area planted under maize ($AREA_t$) considers the lagged area for maize ($AREA_{t-1}$), current producer price of maize (P^m_t) and/or lagged maize prices (P^m_{t-1}), maize substitute price (P^s_t), input price (P^i_t), rainfall ($RAIN_t$) and the government policies (G).The equation 2 above is modelled for the communal and commercial sectors respectively.

The yield equation is modelled, for the communal and commercial sectors respectively, as a function of rainfall:

Equation 3 $$YIELD_t = f(RAIN_t, e_t)$$

The production for maize per each sector is then calculated as an identity equation of the product of the yield and area harvested (proxy for area planted).

Equation 4 $$MZPROD_t = AREA_t * YIELD_t$$

The total maize produced ($MZPROD_t$) is taken as the summation of the commercial sector and communal sector maize production. In each year, the lagged production is complemented by food aid. The food aid equation was estimated as a function of production:

Equation 5 $$AID_t = f(MZPROD_{t-1}, e)$$

4.2 The Demand Component

The demand component consists of human consumption; feed, seed, and ending stock. Seed data is inaccurate while feed data is largely unavailable. Therefore, feed and seed data as well as unaccounted on-farm consumption are taken as the remainder of the balance between supply and demand. Hence in the demand component, ending stock and human consumption and a residual are modelled.

Ending stock is modelled as a function of lagged ending stocks (begging stock) ($ENDS_{t-1}$), lagged real maize prices (P^m_{t-1}) and current production ($MZPROD_t$).

Equation 6 $$ENDS_t = f(ENDS_{t-1}, P^m_{t-1}, MZPROD_t)$$

Human demand on the other hand was modelled as a per capita consumption equation; where per capita consumption (PCC_t) was expressed as a function of real prices of maize (P^m_t), price of substitute (P^s_t), and per capita GDP ($PCGDP_t$) as a proxy for income.

Equation 7 $$PCC_t = f(P^m_t, P^s_t, PCGDP_t)$$

The unaccounted stock, referred to as a residual (RES_t), was postulated to be a function of production ($MZPROD_t$) and current prices (P^m_t).

Equation 8 $$RES_t = f(MZPROD_t, P^m_t, Dummy)$$

A dummy variable was put on the years in which the residual assumed negative values, and this reflects that the data was not sound.

4.3 The Trade Component

The trade component of the model was an identity equation for net trade (net exports) which in this case formed the closing identity. The equation was defined as beginning stock ($BEGS_t$) plus total maize production ($MZPROD_t$) minus human consumption ($CONS_t$) minus ending stock ($ENDS_t$) minus residual stock (RES_t) (which constitutes livestock feed, seed and unaccounted on-farm consumption) in time *t*:

Equation 9 $$NT_t = BEGS_t + MZPROD_t - CONS_t - ENDS_t - RES_t$$

3.4 The Price Component

The price component was modelled as a function of border prices, which in turn are a function of regional prices (P_t^w) and exchange rate ($EXCH_t$), a transport differential from Randfontein to Harare ($TRNS_t$) and government taxes (G).

Equation 10 $$P_t^m = f(P_t^w, EXCH_t, TRNS_t, G)$$

This price is simulated by linking the domestic price to the regional market price and solving the domestic market supply and demand.

5. Empirical Results

The estimated results of 8 behavioural equations outlined in the preceding section were derived from Generalised least Squares (GLS) and Ordinary Least Squares (OLS) estimations in SPSS software. Having estimated the equations, the simulation model was thus constructed in an EXCEL spreadsheet, calibrated to the base year 2000 and then validated by examining

its predictive ability for the period between 1992 and 2000. To enable the generation of a baseline, the model required to be 'solved' in EXCEL for a period during which the FTLRP was implemented. Using the multipliers generated in from the regressions, the exogenous variables were held constant at the 2000 level so as to generate solutions for the endogenous variables.

Important to note however, is the fact that the results were examined for consistency with *a priori* knowledge on Zimbabwe's maize production, demand and trade conditions. With the assistance, judgement and discretion of maize industry experts and from literature which provided general information, maize market commodity knowledge was incorporated into the projection results. The consistency of the projection results was examined mainly by comparing the net trade position projected by production, demand and trading for maize with the actual export and import differences.

5.1 Model Assumptions

The influence of the 'fast track' land reform on exports, GDP, inflation and exchange rate meant that various assumptions had to be made regarding the values of the exogenous variables during the period the 'fast track' land reform was effected so as to remove its effects. The study therefore assumed that the agricultural policy and the macro-economic environment that existed in 1999 continued into the future period. From this context, the baseline projections should therefore be considered as a market outlook rather than a forecast.

Projections for the GDP and the exchange rate were obtained from Global Insight (1999) and the World Bank provided population estimates. According to Global Insight (1999), the GDP was projected to increase to ZW$ 28.21 billion in 2005. The exchange rate was projected to depreciate consistently to ZW$ 102.5/ US$ in 2005. The World Bank estimated that population increased to 12.46 million in 2008. Table 1 below displays the projections of the exogenous variables used in the model.

Table 1: Projections of Exogenous Variables

Variable	2001	2002	2003	2004	2005	2006	2007
GDP (ZW$ billions)[a]	25.64	26.17	26.61	27.36	28.21	28.83	29.46
Exch. rate (ZW$/US$)[a]	82.50	87.50	92.50	97.50	102.50	108.06	113.92
Rainfall (mm)[b]	728.6	465.7	602.0	712.3	529.0	835.7	946.2
Population (millions)[c]	12.50	12.52	12.51	12.50	12.48	12.46	12.45

Source: [a]Global Insight (1999), [b] AIAS (Various Issues), [c]World Bank (2010)

NB: GDP and Exchange Rate are given at 2000 prices

Projections from Global Insight (1999) were made at a time when the 'fast track' land reform was not anticipated. Also, projections were made on the assumption that the then quasi-free market conditions, macro-economic, political and institutional environment that was in place in 2000 persisted into the 'fast track' land reform period.

To further strengthen the argument, the baseline model incorporated 'actual' rainfall and population values since the data for the period of the 'fast track' land reform was available. This would allow for the determination of droughts that occurred in the projection period, which would also improve the performance of the model.

5.2 The Re-simulated Baseline

Based on the assumptions discussed in the preceding section, the model generated an artificial dataset of 'would be' outcomes without the 'fast track' land reform. This market outlook of the Zimbabwean maize sector is technically referred to in this study as a re-simulated baseline. Thus, the outlook reflects the general picture of the Zimbabwean maize sector if no 'fast track' land reform occurred. This implies that the performance of the market in the re-simulated baseline is founded on the assumption that no 'fast track' land reform took place in 2000 and stable political and macro-economic conditions prevailed. The 'fast track' land reform policy decision can thus be assessed by looking at the differences between the baseline and the actual market values of what occurred during the land reform era.

The maize sector was affected to various extents by the dynamic interplay of four variables which shall be unpacked under this section. These include GDP, exchange rate, rainfall and

land transfers between the communal and commercial sectors. Theoretically, the consistent fall in actual GDP translates to a fall in per capita income and therefore a collapse in demand. The consistent depreciation in the exchange rate caused by a dwindling export base had an effect on the price incentives which influenced farmer responses, and therefore area planted, which in turn affected production. There is also the influence of rainfall on production which has been widely debated in the literature. Then, during the same period, there were on-going land transfers between the communal and commercial sectors, whose composition affects yield and output. Important to note is that land transfers between the communal and commercial sectors were still going to occur even if the 'fast track' land reform programme was not implemented because there still existed a framework for land acquisition before 2000. The model therefore attempted to unpack each of these aspects under two scenarios. The scenario presented below, called the 'fast track' land reform scenario, compares the re-simulated baseline against actual outcomes to show the impact of the policy on the maize sector taking into account the effects of rainfall, exchange rate and per capita income.

Scenario: The 'Fast Track' Land Reform Policy

A comparison of the 'actual' outcomes versus the re-simulated baseline is displayed in Table 2 below. In the table, the re-simulated baseline is stated as 'baseline', and these two terms are used interchangeably because they technically hold the same meaning. A baseline is a market benchmark against which various policies are analysed, and in this study, the term 're-simulated baseline' implies that the benchmark is re-set against a retroactive market scenario *ex-post facto.* The percentage change displayed in the table represents the difference between the re-simulated baseline and what actually occurred in the maize market. This difference represents the 'fast track' land reform policy's impact on the maize sector. Important to note is that the 'baseline' outlined in Table 2 for each endogenous variable reflects the benchmark of Zimbabwe's maize market and the model's full response to rainfall, but not any other policy shock. This sets the study's argument into perspective, as the model's simulated output gives a logical and empirical basis upon which to respond to unsubstantiated claims of the 'fast track' land reform policy's influence on maize production taking into account the effects of rainfall.

Table 2: Impact of the 'Fast Track' Land Reform Policy

	2001	2002	2003	2004	2005	2006	2007
Commercial Area				**'000 tonnes**			
Baseline	145.63	122.66	124.85	131.38	118.40	138.83	147.28
Actual	155.89	128.83	126.58	93.01	70.44	62.84	55.68
% Change	7.04	5.04	1.39	-29.21	-40.50	-54.73	-62.19
Communal Area				**'000 tonnes**			
Baseline	1350.42	1319.26	1382.96	1474.91	1463.72	1606.94	1713.14
Actual	1084.10	1199.02	1225.79	1400.80	1659.42	1650.16	1390.13
% Change	-19.72	-9.11	-11.36	-5.02	13.37	2.69	-18.85
Total Area Harvested				**'000 tonnes**			
Baseline	1496.05	1441.92	1507.81	1606.29	1582.12	1745.76	1860.42
Actual	1239.99	1327.85	1352.37	1493.81	1729.87	1713.00	1445.82
% Change	-17.12	-7.91	-10.31	-7.00	9.34	-1.88	-22.29
Commercial Yield				**tonnes/ha**			
Baseline	4.20	3.15	3.69	4.13	3.40	4.57	4.82
Actual	3.42	2.28	1.91	1.94	1.11	1.57	1.45
% Change	-18.63	-27.55	-48.37	-53.12	-67.45	-65.55	-69.81
Communal Yield				**tonnes/ha**			
Baseline	0.85	0.78	0.82	0.85	0.80	0.87	0.89
Actual	0.92	0.26	0.67	1.08	0.51	0.84	0.78
% Change	7.80	-66.96	-18.51	26.99	-36.88	-3.93	-12.71
Total Production				**'000 tonnes**			
Baseline	1759.97	1420.65	1593.07	1791.45	1574.08	2039.26	2234.16
Actual	1526.48	604.67	1058.98	1686.02	916.06	1485.04	1161.10
% Change	-13.27	-57.44	-33.53	-5.89	-41.80	-27.18	-48.03
Maize Prices				**ZW$/tonne**			
Baseline	53.07	53.84	55.32	57.66	59.25	62.88	65.97
Actual	87.25	69.28	152.61	81.26	79.32	84.45	100.86
% Change	64.41	28.68	175.85	40.92	33.87	34.30	52.89
Net Trade				**'000 tonnes**			
Baseline	405.26	-436.01	355.71	627.39	-8.09	830.56	850.53
Actual	-88.66	-763.59	-340.17	-184.90	-685.98	-250.66	-385.65
% Change	-121.88	75.13	-195.63	-129.47	8383.33	-130.18	-145.34
Total Domestic Use				**'000 tonnes**			
Baseline	2923.07	2049.00	2093.93	2283.65	2081.54	2529.79	2761.70
Actual	2689.57	684.67	1178.98	1756.02	1036.06	1605.04	1281.10
% Change	-7.99	-66.59	-43.70	-23.10	-50.23	-36.55	-53.61

Source: Model Results

One important point the model captures is the influence of rainfall on the maize market. While previous arguments in support of the 'fast track' land reform policy have stressed that droughts have been the main cause of Zimbabwe's food crisis, the model shows that the effects of droughts would have been far less severe if the pre-2001 maize market conditions had persisted into the 'fast track' land reform period. As shown in Table 2 above, maize production in 2002 would have been 1.42 million tonnes, which is above the 604 000 tonnes actually produced under the 'fast track' land reform policy. In the 2005 drought season, 1.574 million tonnes of maize output could have been produced against the actual 916 000

tonnes. The maize market therefore produced 57.44 % and 41.8 % less output than what could have been produced in the 2002 and 2005 droughts had the government not implemented land reform. Moreover, maize produced in 2006 and 2007 would have surpassed 2 million tonnes under the pre-2001 pseudo-free market system and agricultural policies. Thus, in 2007, maize production was 48 % less what the market could have produced without the land reform policy.

Maize Area Harvested

The impact of the 'fast track' land reform on sectoral maize area harvested is difficult to gauge due to the restructuring and shifts of land between and across the communal and commercial sectors. However, from an abstract point of view, we may take the area harvested between the respective sectors as per definition of commercial and communal sectors outlined in Chapter two.

The results of the re-simulated baseline shown in Table 2 above indicate that the commercial area harvested was negatively affected by the expropriation of commercial farms. The 'fast track' land reform policy shift caused land transfers from the commercial to the communal sector, with perhaps much of the loss in area planted being due to the stalling of farming operations due to unrest and uncertainty. Comparatively, the area harvested was 39 % less than what could have been harvested in the first year, and this decline continued throughout the next six years. Throughout the 'fast track' land reform period, commercial area planted declined and was on average 61 % below its potential within the period from 2001 to 2007. The long run impact of the 'fast track' land reform on commercial area harvested was a negative 80.57 % in 2007 (see Table 2). The expropriation of commercial farms thus severely reduced the commercial maize area planted.

Potentially, the maize area planted by the commercial sector could have fluctuated above 234 000 hectares if the 'fast track' land reform was not implemented. As shown by the graph in Figure 3 below, maize area planted could have peaked at 277 000 hectares in 2002, and surpassed 286 thousand hectares in 2007. Marginal declines would have occurred in the drought years of 2003 and 2005, with area harvested falling to 234.06 thousand and 240 thousand hectares, respectively. As the re-simulated baseline depicted on the graph below,

the commercial area harvested without the 'fast track' land reform would have been well above 150 000 hectares throughout the period under consideration.

Higher levels of commercial area harvested would have presumably been driven by the increase in the importance of the feed market, as feed use was set to increase following the increase in stock feed prices that necessitated the need for farm-based feed production. Additionally, the growing significance of the beef and livestock exports within the region and to the European Union market was expected to play a greater role in driving the increase in commercial land area under maize.

The baseline results show that actual communal sector area harvested would have initially been below the baseline up to 2003. At this point, the question is why the actual communal area harvested remained lower than the re-simulated baseline given that the 'fast track' land reform had allocated land to the communal sector? It could be due to depressed maize prices in 2001 which could have discouraged the farmer's land area allocated to maize. Perhaps, it could have been the uncertainty around political connotations over the land reform, as well as the outcome of the 2003 elections could have made some communal farmers uncertain of taking up more land. Although possible explanations exist, it is important to remember that land transfers were on-going before 2000, and the model captures these through trends in area harvested between the communal and commercial sectors. Therefore, it may be argued that the previous land acquisition framework would have led to more communal area harvested in the first three years of the model's projections.

The 'fast track' land reform impacts on communal area harvested can only be visibly seen from 2004 onwards, where the actual communal area harvested went up to 15.57 % above the baseline projections in 2004 (see Table 2). This may have been due to reaffirmations from the 2003 presidential elections and the political commitment through the increased allocation of land. The communal area harvested continued to respond positively to the land reform in 2005 and 2006 with areas being 35.98 % and 39.51 % above baseline projections. However, the 2007 communal area harvested equated actual area harvested. This may imply that in the long run, the 'fast track' land reform had no significant impact on communal area harvested, as market based land reform would have been the same as 'fast track' land reform in the sixth year after the policy shift.

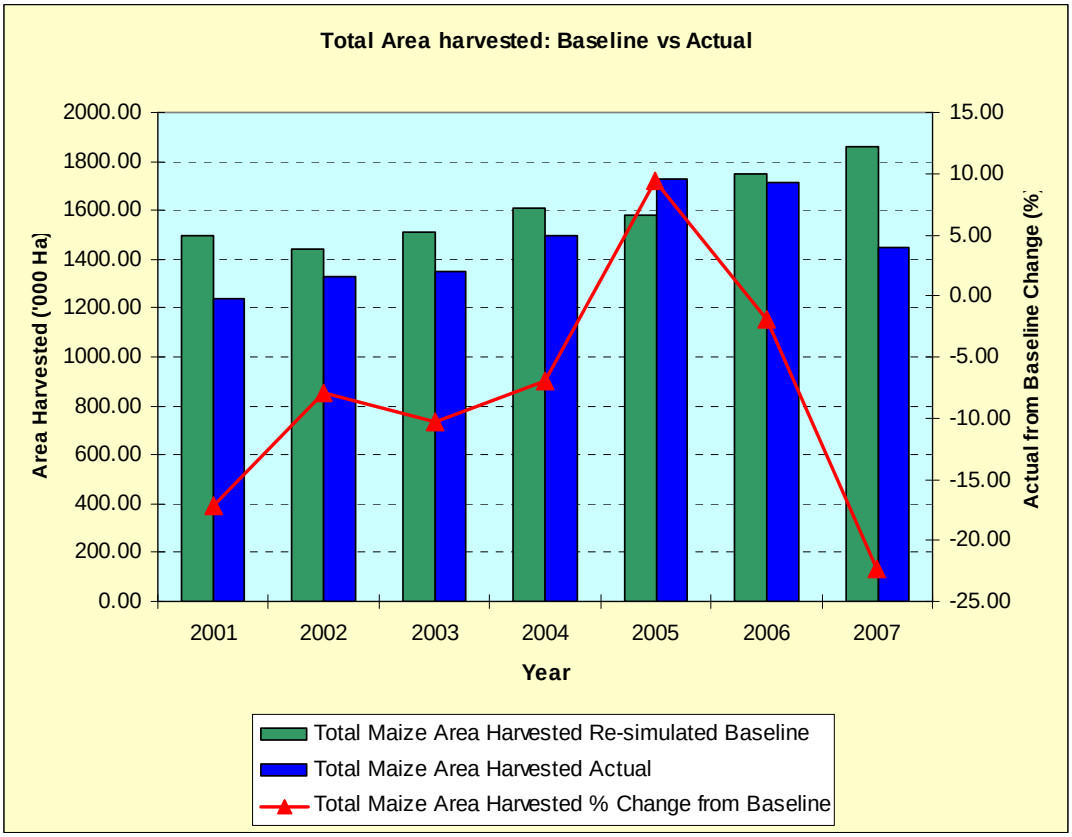

Figure 4: Total Maize Area Harvested: Re-simulated Baseline vs Actual
Source: Model results

From an aggregate national perspective, total maize area harvested was 18.48 % below potential in 2001. Total area harvested was below the baseline in 2002, 2003 and 2007, with 'actual' national area harvested at 15.85 %, 8.04 % and 13.68 % less than areas that could have been harvested, respectively. From 2004 to 2006, 'actual' national areas harvested were above the baseline, as the 'fast track' land reform had a 2.91 %, 16.53 % and a 20.38 % positive impact in 2004, 2005 and 2006 respectively.

Total Maize Production

The baseline model showed that actual total production was much less than potential during the 'fast track' land reform period. A graphical illustration of the baseline against actual values shows that the baseline is in essence an upward shift of the actual output trajectory in

the years of the land reform period (see Figure 7.5 below). This means that Zimbabwe's maize market performed below potential in the period of the land reform.

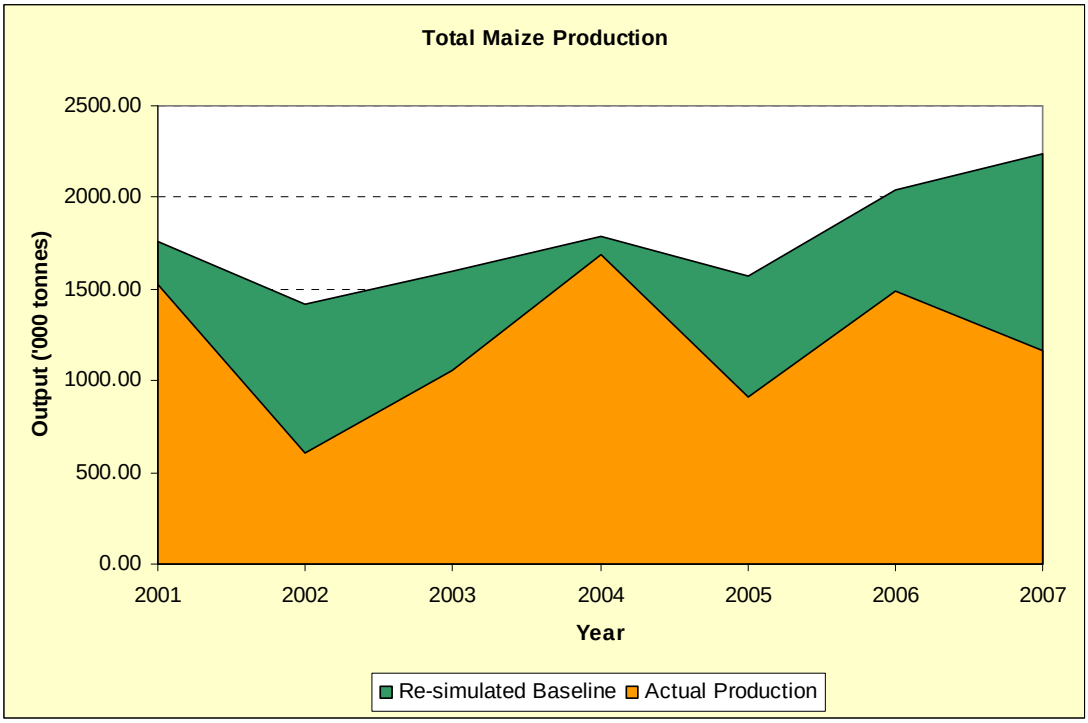

Figure 5: Total Maize Production
Source: Model Results

Visual inspection of the baseline on total maize output thus shows that the baseline model almost mimics the trajectory pattern of actual output, with the expected drops in output in the 2002/03 and 2004/05 drought seasons being observed.

Total production was 25.34 % less than what could have been produced in 2001, the year that the 'fast track' land reform policy was formally implemented. Even in the 2002/03 drought, output was 61.85 % less and 36.81 % less than what could have actually been produced for the 2002 and 2003 seasons, respectively. In the 2005 drought season, the total maize production was 43.88 % less than what could have been produced without land reform and under a stable macro-economic and political environment. In 2007, the baseline showed that the nation could have produced almost 50 % more than what was actually produced.

The baseline expected the total maize output to continue to recover after the 2005 drought to reach output levels above 2 million tonnes, against a drop in actual output. This divergence may be attributed to the uncertain political and economic environment triggered by the 'fast track' land reforms. Since the 'fast track' land reform impacted on maize production, it therefore follows that these reforms had ripple negative implications on net maize trade.

Net Maize Trade

The net maize trade is the volume of exports minus imports. The actual net trade position has been negative since 1999 and this trend persisted after the expropriation of the commercial farms as shown in Figure 7.6 below. The persistent negative maize trade has been partly attributed to the discretionary ban of exports after the collapse of the strategic reserve policy.

The assumption made on the re-simulated baseline was that the ban was lifted and exports resumed. Assuming that exports resumed in 2001, the baseline revealed that Zimbabwe should have remained a net exporter throughout the 'fast track' land reform period, except in 2002. The re-simulated baseline depicts that the highest net maize trade would have been achieved in 2006 and 2007, reaching above 800 000 tonnes. The net maize trade was going to fall in 2002 to a deficit of 509 000 tonnes due to an acute drought. The 2005 drought was again expected to reduce the net trade position to below 20 000 tonnes, following which it was expected to recover afterwards.

Yet, throughout the reform era, Zimbabwe has had to import substantial amounts of maize in addition to the food aid that it has received owing to insufficient production. According to the re-simulated baseline, net maize trade would have remained positive except in the 2002 drought. This is because maize import demand would have been partially offset by high production. High levels of production and exports after 2000 were expected to be the major driver of positive maize net trade. As the baseline results reveal, without the 'fast track' land reform, net maize trade was going to be positive in 2001 and from 2003 onwards, with the maintained positive net trade emanating from the higher levels of total production, that would have led to higher levels of exports.

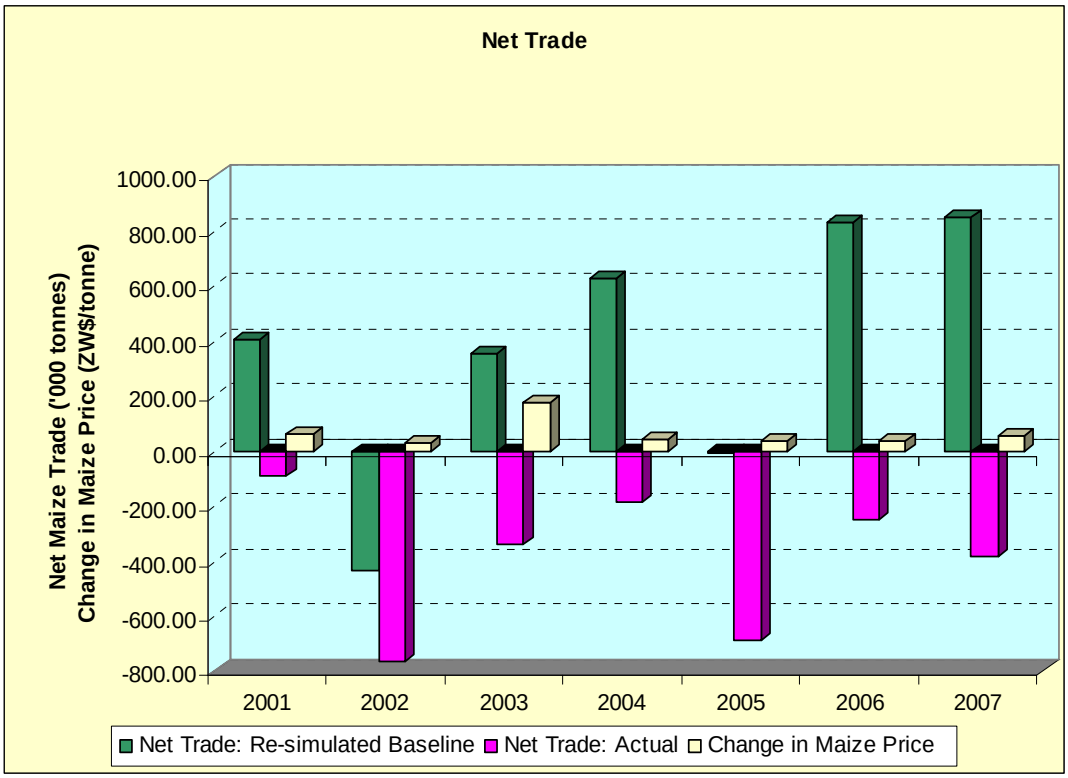

Figure 6: Maize Net Trade

Source: Model results

Since the literature points out that net trade was an important consideration in the setting up of prices, Figure 6 sets out the price effect that the impact of the net exports would have had on the market. Maize prices were going to change by an average of ZW$ 34.18 in 2001. The 2002 change in net trade was going to induce a change of ZW$ 97.29, the highest impact in the seven year period.

Total Domestic Use

Figure 7 below reveals that demand for maize collapsed and this is shown by the fairly large differences between the re-simulated baseline of what could have happened under stable conditions and what eventually occurred under conditions of declining per capita GDP and under-production. The per capita consumption of maize declined sharply from 110 kg/person/year in 2001 to 92 kg/person/year in 2002. Since then, per capita consumption has not gone beyond 98 kg/person/year reflecting the slump in demand during the period of the 'fast track' land reform.

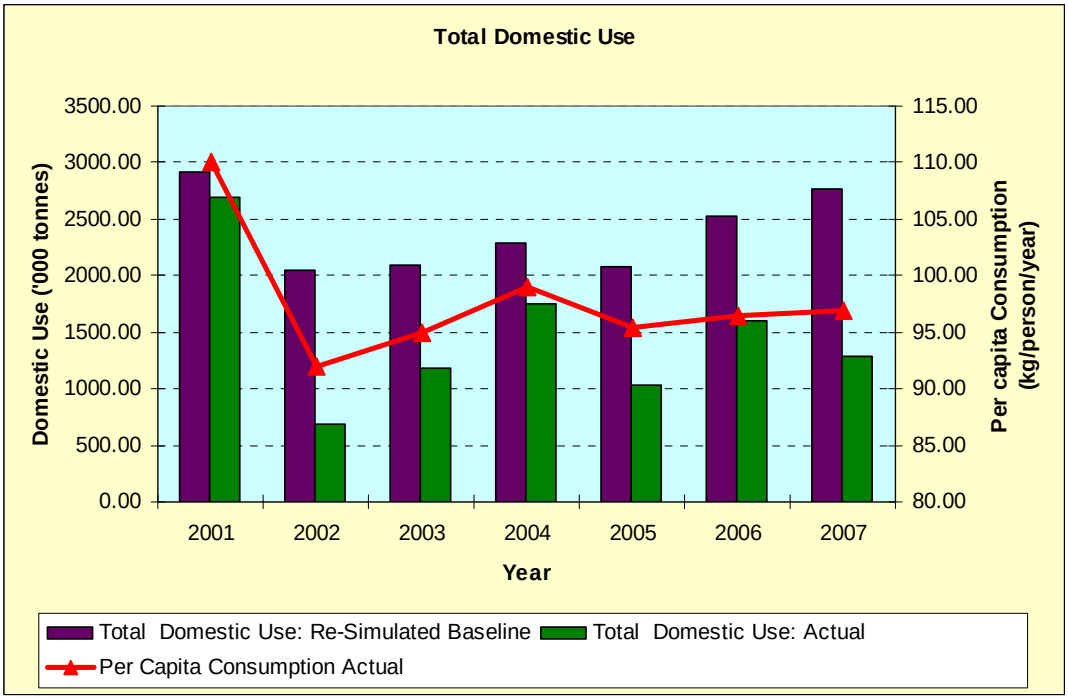

Figure 7: Total Domestic Use

Source: Model Results

According to the results of the model, the largest impact on total domestic use was in 2002, 2005 and 2007 in which domestic consumption was 66.6 %, 50.2 % and 53.6 % below potential, respectively.

5. Conclusion

The main aim of the article was to re-assess and model the impact of the 'fast track' land reform on the maize market. We have tried to address this issue from the viewpoint that analysing the 'fast track' land reform impact is complex given the intricacy of agricultural markets. The study proposed that the 'fast track' land reform impact may be elicited from how the market would have performed under the assumption that the 'fast track' land reform was not implemented. The authors feel that if these pointers are ignored or continue to be neglected, the argument on 'fast track' land reform impacts may be misinformed, mystifying and distorted. It is hoped that this article will provoke a re-think of policy analysis of

Zimbabwe's food crisis and trigger discussion on how to fully integrate land reform policy into market analysis.

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