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PRICE INSTABILITY IN THE MAIZE MARKET IN MALAWI

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Abstract

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The thesis examines seasonal price instability in the Malawi maize market over the 21-year period from 1989 to 2009, covering five interlocking dimensions. The first establishes the reasons that maize price instability in Malawi is critical for vulnerability to food insecurity. The second sets out the causes and effects of price instability, and its relationship to the history of the maize market in Malawi. The third analyses the average magnitude of seasonal price changes, and contextualizes this in relation to different district maize markets and different food crops. The fourth examines the competitiveness and efficiency of the Malawi maize market. The fifth provides an analytic narrative account of three episodes of extreme maize price volatility experienced in Malawi between 2000 and 2009.

The thesis produces a number of findings. The gross seasonal margin for maize in Malawi averaged 60 per cent in the period 1989-2009. Seasonality varies by location, with the highest seasonal margins occurring in remote rural areas, and places close to border crossing points for informal maize imports. Other food crops exhibit less price seasonality than maize, and two of them, rice and beans, display evidence of declining price seasonality. The structure and conduct of the maize market is competitive at local and more aggregate levels of market participation. Cointegration analysis shows that the maize market is spatially efficient. Extreme price spikes follow similar patterns, characterized by the dominance of political over economic considerations.

The private-public coordination problem takes central position in the policy interpretation of these findings. The thesis would concur with the prognosis of other researchers that until the government adopts a rule- rather than discretion-based approach to maize market management, episodes of excessive instability in the maize market are unfortunately likely to recur in the future.

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List of Abbreviations and Acronyms

ACE	Agriculture Commodity Exchange for Africa
ACEs	Agricultural Commodity Exchanges
ADD	Agricultural Development Division
AEFS	Adult Equivalent Family Size
AEU	Adult Equivalent Unit
ADMARC	Agricultural Development and Marketing Corporation
AEDC	Agricultural Extension Development Coordinator
AEDO	Agricultural Extension Development Officer
AIC	Akaike information criterion
AISP	Agricultural Input Subsidy Programme
ASAC	Agricultural Sector Adjustment Credit
CARD	Church Action in Relief and Development
CPI	Consumer Price Index
DADO	District Agricultural Development Officer
DRIP	Drought Recovery Inputs Programme
EMOP	Emergency Operation
EPA	Extension Planning Area
FEWS	Famine Early Warning Systems
FPE	Prediction Error
GSI	Grand Seasonal Index
GTPA	Grain Traders and Processors Association
GTZ	German Technical Cooperation
HEA	Household Economy Assessment
HQIC	Hannan–Quinn information criterion
IDEAA	Initiative for Development and Equity in African Agriculture
IHS2	Second Integrated Household Survey
KACE	Kenya Agriculture Commodity Exchange
LR	Likelihood Ratio
MACE	Malawi Agriculture Commodity Exchange
MASAF	Malawi Social Action Fund
MAWTCO	Malawi Agricultural Warehousing and Trading Company,
MGCWCS	Ministry of Gender, Child Welfare and Community Services
MRCs	Market Resource Centres
MIS	Market Information Systems
MoAFS	Ministry of Agriculture and Food Security
MSA	Moving Seasonal Average
Mt	Mount
MVAC	Vulnerability Assessment Committee
NAPEC	National Agricultural Production Estimates Committee
NFRA	National Food Reserve Agency
PWPs	Public Works Programmes
RATES	Regional Agricultural Trade Expansion Support
SADC	Southern Africa Development Community
SAFEX	South African Futures Exchange
SBIC	Schwarz–Bayesian information criterion
SFFRFM	Smallholder Farmers Fertilizer Revolving Fund of Malawi
SFRF	Smallholder Fertilizer Revolving Fund

SGR	Strategic Grain Reserves
SI	Seasonal Index
SIP	Supplementary Inputs Project
SR-1	Southern Rhodesia-1
SR-2	Second Southern Rhodesia hybrid
SSA	sub-Saharan African
TAR	Threshold Auto Regression
TIP	Targeted Input Programme
WFP	World Food Program
WMS	Welfare Monitoring Survey 2008
VAR	Vector Auto Regression
UDF	United Democractic Front
USAID	United States Agency for International Development

Chapter 1 Introduction

1.1 Introduction

In common with other sub-Saharan African (SSA) countries, Malawi has long relied on maize as the principal source of dietary carbohydrate for its growing population. The origin of this African reliance on maize is somewhat obscure; maize, after all, originated in Central America where it was the main pre-conquest food staple in what is now modern day Mexico and Guatemala (Rebourg *et al.*, 2003). Maize came to Africa with the slave trade in the 17th century, and was initially grown close to the coast in West African countries that were the sites of Atlantic slave trading (McCann, 2005, Ch.2). In the 18th and 19th centuries maize spread throughout Africa, and eventually came to dominate the diet of the peoples of eastern and southern Africa (Miracle, 1965). Portuguese sailors and traders seem to have been instrumental in this process, but also significant internal migrations occurred across the continent during that era. By the time of the early colonial period (early 1900s) in countries like Northern Rhodesia, Nyasaland and Tanganyika (modern day Zambia, Malawi and Tanzania) maize was already by far the most important food crop grown by local smallholder farmers, and so it has remained up to the present time.[1]

Maize is a critical food security crop *par excellence*, similar in its role in eastern and southern Africa to wheat in the earlier history of Europe, and rice in East and Southeast Asia. The ability of the population either to feed themselves directly from their own maize production, or to secure maize at affordable market prices, is at the centre of food security in many countries, and more so in Malawi than in other countries that have more diverse patterns of food output and consumption. All aspects of maize are critical in such circumstances: the reliability of production, the effectiveness of storage, the availability for purchase in the lean season, the level of prices received by farmers who have surplus to sell, or paid for maize by families that find themselves in food deficit. Factors that disrupt or deteriorate any of these aspects can cause failures of food entitlement (Sen, 1980; 1981) with consequent misery and hunger either on a localised or wide scale.

[1] As with all such historical processes, the transmission routes for the diffusion of maize in Africa were, in reality, complex and multi-stranded, and available evidence leaves scope for different interpretations of the principal historical sequences involved (see Miracle, 1965 and McCann, 2005 for informative accounts).

The chief way that fluctuations in maize availability manifest themselves in domestic economies is in unstable maize prices, and specifically in price changes that occur between the harvest period of one crop cycle and the pre-harvest period of the next (intra-seasonal price changes), and changes in price level that occur from one year to the next, depending on production outcomes (inter-seasonal price changes). For a staple food crop like maize that is mainly consumed by its own producers, seasonal price changes can be exaggerated because marketed supply is only a small proportion of total production. The logic of this is set out later in the thesis. For now, it is sufficient to note that the market for maize in a country like Malawi is what economists call a 'thin' market, meaning that the traded part of the market is a relatively small proportion of total production and consumption. A characteristic of thin markets is that prices in them tend to change disproportionately (up or down) when small imbalances between supply and demand occur (Hayenga, 1978).

Seasonal price instability in the maize market in Malawi is the central topic and unifying theme of this thesis. While price seasonality is a widely recognized problem in Malawi and other eastern and southern African countries, being alluded to in relation to market liberalisation (Jayne *et al.*, 1997; 2002; Jayne and Tshirley, 2009), market and coordination failures (Doward and Kydd, 2004; Poulton *et al.*, 2006a), national food security (Harrigan, 2001; 2008) and household vulnerability to hunger (Devereux, 1997; 1999), the long-term patterns of such seasonality in Malawi have yet to be examined by researchers, and no previous analysis of price seasonality over the 20-year timescale covered in this thesis (1989-2009) has been previously undertaken. This is not for want of sufficient data since weekly data on maize prices has been collected using the same methodology for 38 different markets over this entire period (Government of Government of Malawi, 2003). Nevertheless, researchers have tended to be preoccupied with other aspects of maize market functioning, often in relation to critical events in the working of the market in the short and medium term.

A key entry point to the thesis is a collection of papers and a report produced in 2005 on the topic of risk and price instability in staple food markets in low-income countries. These publications arose from a workshop held in Washington DC in February 2005, at which many of the leading authorities on food markets in low-income countries were present. The workshop resulted in a World Bank report on this topic (World Bank, 2005), as well as a collection of papers in a special issue of the journal *Food Policy* (Byerlee *et al.*, 2006).

The contributions to this body of work emphasize the continued importance of seasonal price instability for growth and food security objectives, especially in very poor countries containing substantial populations that are both rural and food deficit from their own production; and that consequently are highly prone to being unable to afford sufficient food in the lean season before the next harvest. In addition to representing a serious problem for the protection of the poorest from hunger, high price instability is detrimental to the poor constructing their own routes out of poverty, since it increases the risk of failing to secure food from the market and reinforces a pattern of subsistence reliance on one or a few main food crops for household level food security. In addition price instability acts as a disincentive to surplus producing farmers, and to private investment in marketing infrastructure, since returns to such investment are so uncertain.

These arguments are elaborated in more detail in Chapter 2 of the thesis, where they are contextualised in the broader literature on food price instability. Here it is useful to draw attention to some key findings and themes that many eastern and southern African countries share in common, and that provide useful pointers for locating the study of maize price instability in Malawi.

The farm size structure of production is a key feature creating particular impacts of price instability in countries of this region. One important consideration is that farm size in the smallholder sector has been declining for the past 40 years and is estimated in Malawi, Zambia, Kenya and Ethiopia to have approximately halved over this time interval (Jayne *et al.*, 2003). In addition, the distribution of landholding size is highly unequal within the small farm sector. Data on farm sizes for five countries cited in Jayne *et al.,* (2006) reveal mean farm sizes in the small farm sector ranging from 1 ha in Rwanda and Ethiopia to 2.5-3.0 ha in Kenya and Zambia. The bottom 20 per cent of the land distribution is approaching functional landlessness in all cases, with access to less than 0.5 ha of land. According to the same source, in Malawi 80 per cent of smallholder farm households possess less than one ha of land.

These land distributions imply highly unequal and differentiated participation in grain markets. Specifically, about half of the marketed output is supplied by just 2-3 per cent of farmers, operating in the farm size range of 4-20 ha. The remaining half of marketed supply originates from a second tier of roughly 20 per cent of households, selling in the range of 0.1 to 5 tons maize per household. A third rural group are buyers only of staple grains, corresponding to 40-60 per cent of all rural households. A fourth group both buy and sell grain within a calendar year, and these correspond to 10-20 per cent of rural households. Finally, there are households that neither buy nor sell the staple grain, implying either that they are more or less self-sufficient in an average year, or that they have one or more additional food crops that fill the gap between their staple grain production and their consumption needs. Cassava is typically the crop that can contribute to self-sufficiency in carbohydrates in this way.

These categories of the rural population are affected in different ways by food price instability (Jayne *et al.*, 2006, pp.334-5; Poulton *et al.*, 2006b, pp.343-4). Particular attention must be paid to the large proportion of buyers only or net buyers of staple grain, since they correspond, with variations in different countries, to around 50 per cent of the rural population. This category is adversely affected by above average price hikes, whether these occur for intra-seasonal or inter-seasonal reasons, and the extent of the damage to their consumption capabilities depends on just how high prices go, and the intensity of the shock factor created by the unexpected inability to purchase enough food. Surplus food producers are affected in the opposite way, by exaggerated price troughs that can occur, both intra- and inter-seasonally due to the arrival of a bumper harvest. A price collapse at harvest sharply reduces their expected real income from crop sales, and acts as a disincentive to make investments in farm intensification, with knock on effects for agricultural growth. A third category for whom undue price instability represents a serious problem are 'distress sellers' who place themselves in a difficult position at both ends of the market, gaining less from their sales if prices slump, and finding themselves unable to buy when prices soar.[2]

Most countries in eastern and southern African region have a dual grain marketing structure comprising a state marketing or food security agency, and private traders of varying sizes, market niches, and outreach. A key issue for price stability is how the private and public sectors interact when an initial disturbance causes a chain of responses on each side of the public-private divide. The nature of this public-private

[2] The term 'distress sales' refers to involuntary sales made to meet unavoidable obligations at harvest time including paying off debts to traders and moneylenders, buying food essentials other than the staple grain, and meeting urgent school or medical expenses.

interaction is part of a continuing debate in food and broader agricultural policy about the proper role of governments in liberalised markets that have failed to deliver the outcomes for agricultural growth that were expected by liberalisation enthusiasts.

One side of this debate emphasises institutional weaknesses in liberalised markets, and the continuing crucial role of government in coordinating actions and services that the private sector fails to deliver successfully due to risk, transaction costs, moral hazard and missing markets (de Janvry *et al.*, 1991; Dorward *et al.*, 1998; 2005a; 2009a; Kydd *et al*., 2002; Poulton *et al*., 2006a). The other side points to the failure of government to properly let go its controlling capabilities in staple food markets, because efforts by private marketing agents are hampered by regulatory powers that are erratically and arbitrarily invoked, increasing risk and aggravating the unwillingness of the private sector to invest in improving marketing infrastructure and services to farmers (Kheralla *et al.*, 2000; Jayne *et al.*, 2002). These arguments overlap a lot, and all informed observers agree that predictability, transparency and adherence to rules rather than discretion in decision-making are necessary for the public-private relationship in food markets to work effectively.

From the viewpoint of this thesis, one particular area of this policy discussion is of particular interest which is the degree to which public-private coordination failures can result in greater price instability than would occur either under complete government control, or under truly private market decision making, including freedom by private traders to import or export grain according to their own judgement regarding the balance of supply and demand in the market. As articulated by Jayne *et al*., (2006):

> '. . . .the strategic interactions between private and public marketing actors leading in some cases to heightened market instability and food crises' (Ibid., p.328).
>
> 'This case [the Malawi food crisis of 2001-02] illustrates that well-intentioned but poorly implemented government actions can exacerbate food price instability rather than reduce it' (Ibid., p.336).

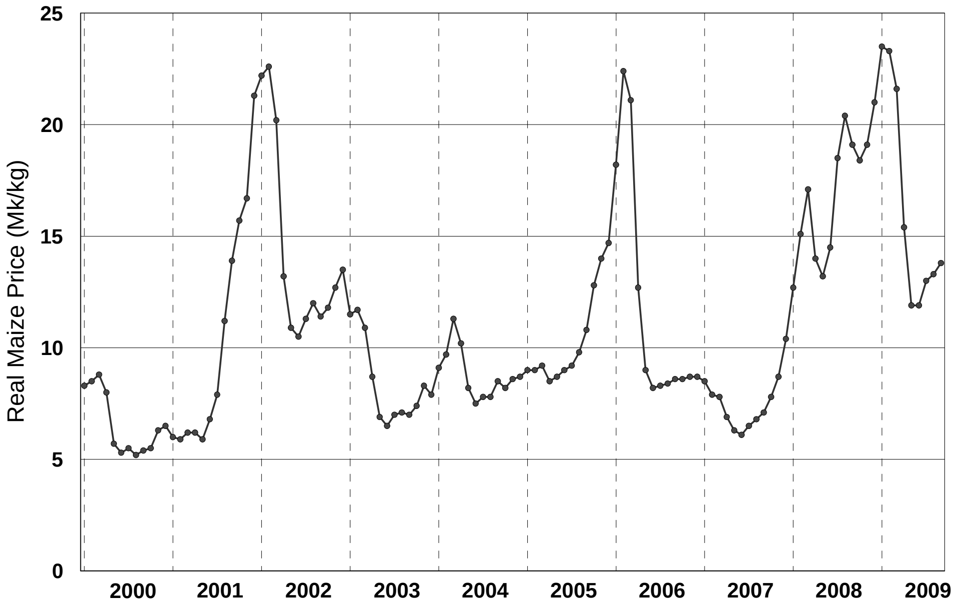
The foregoing discussion indicates two subsidiary areas that play important supporting roles in this thesis, in relation to the primary emphasis on maize price instability itself.

The first of these is the conduct and performance of private maize trading in Malawi, especially at local levels where dimensions of competition, choice and market structure in privately traded maize are investigated. The second takes its lead from the two quotations provided above and comprises examination of sequences of events, and private-public market interactions, that have occurred on occasions of maize price crisis in Malawi in the 2000s in which coordination failures may have resulted in substantially more severe outcomes for price levels and hunger amongst vulnerable sections of the population than could have pertained given the policy levers at the government's disposal. Politics also importantly enters food policy decision making in such circumstances (Byerlee *et al.*, 2006, p.285), and the part of the thesis that tackles these crisis situations also integrates political factors into the explanation of sequences of decision making actions as they occurred.

In summary so far, this thesis is about price instability in the domestic market for the staple food commodity of a poor country, utilising maize in Malawi as its case study. Price instability has various causes, and serious ramifications for poverty, hunger and agricultural growth. The core empirical effort of the thesis is directed at measuring maize price instability in Malawi, with special attention paid to departures from 'average' instability, and on whether instability seems to be growing, remaining stable, or diminishing over time. Comparisons with other food crops are made. The competitiveness and efficiency of private maize trade and coordination failures at the interface between public and private roles in the maize market play important supporting roles.

As a foretaste of the later focus of the thesis, Figure 1.1 displays the pattern of maize prices experienced in Malawi during the 2000s, using monthly price data. This data is a national average, calculated from prices in 38 agricultural markets up until 2005, and 72 markets since 2005scattered across the country. Nominal prices have been deflated by the monthly rate of change in the consumer price index (CPI) in Malawi to give the real price trend. It can be seen from this graph that seasonal price fluctuations are routine in Malawi; however, since 2000 there have been three occasions when extreme price instability has occurred. In addition, it is apparent that real prices may have been rising in this decade. Indeed maize prices have been rising towards import parity, so that the more extreme seasonal price spikes shown in the graph have taken lean season prices well above import parity in the Malawian case (Jayne *et al.*, 2006; Jayne and Tschirley, 2009). It is notable that these price events in the domestic market do not correspond to

Figure 1.1: Malawi: Real Maize Price Trend 2000-09



Note: Nominal maize prices deflated by the Malawi CPI 2000=100.0
Source: Calculated from monthly price data collected by MoAFS, Agro Economic Survey Unit

trends in international maize prices; indeed the Malawi maize price spike that occurred towards the end of 2008 corresponded to a steeply declining trend in international prices after the 2007-08 ‘food price crisis’. This graph therefore exemplifies many of the aspects that this thesis sets out to tackle: the degree of price instability, the incidence of unusual instability events, the functioning of private markets that may or may not contribute to such events, the public-private interface that seems critical for understanding such events. The rest of this chapter restates the objectives and research questions of this thesis more formally, and provides some basic factual information on maize in Malawi including its national contribution to nutrition, production trends and yields. The chapter concludes with a brief description of the structure of the rest of the thesis.

1.2 Thesis Objective, Research Questions and Methods

The objective of this thesis is to gain an in-depth understanding of maize price instability in Malawi; its characteristics and patterns; its causes in the economics, institutions and politics of the maize market; and the policy leverage that might be brought to bear to diminish its magnitude and adverse impacts in the future. The reasons for such an objective are rooted in the singular importance of maize for food security in Malawi, the not infrequent incidence of extreme instability events when seasonal price changes are double or triple the normal price range, and the excessively damaging effects that such events have for the welfare of the country's poorest and most vulnerable citizens. All these aspects are given due attention in the thesis, which also provides a history of maize market regulation in Malawi and grapples with the difficult dimension of the politics of maize in a country where this single food commodity plays such an overwhelmingly central role in the food security and nutritional status of the population.

The central objective is buttressed by two subsidiary areas of enquiry that are designed to lend support to the chief focus on instability. One of these concerns the functioning of private trade in maize in Malawi, about which much has been written (and this is synthesised in the thesis), and which is also investigated by fieldwork in three maize producing villages, and by cointegration analysis of time-series price data in different markets. The other concerns the interaction between the public and private sectors that occur at times of maize price crises in Malawi, of which there have been several occurrences during the 2000s. This involves examining specific sequences of events and decisions at times of maize market crisis, and bringing in political as well as economic and institutional considerations that can shed light on the unfolding of events. Specifically, the thesis investigates the following research questions, in pursuit of its overall objective:

(a) what is the underlying, long term, character of seasonal maize price instability in Malawi, during the 21-year period 1989-2009?

(b) is there a detectable trend in the extent of such instability, and does the degree of instability vary between markets in different parts of the country?

(c) how does maize price instability compare to that of other food crops over the same historical period?

(d) what lessons can be learnt from the functioning of private maize trade in Malawi that may shed light on patterns of price instability, especially with respect to competition, choice, market structure, and spatial price behaviour?

(e) examining 'events' of extreme maize price fluctuations in Malawi in the 2000s, what can be learned about the influence of world markets, state regulatory behaviour, public-private coordination, and the politics of public decision making in helping to explain the prevalence and intensity of such events?

The first three of these questions are examined using a toolbox of statistical methods for examining time series price behaviour in markets that have an established position in agricultural market analysis (Goetz and Weber, 1986; Sahn and Delgado, 1989; Trotter, 1992; Maddala and Kim, 1998). This methodology is set out in full in Chapter 3 of the thesis. Question (d) is explored in part using both qualitative and quantitative data collected during field visits to maize producing villages in the south, centre and north of Malawi in mid-2008, during the maize harvesting season. These field visits implemented questionnaires to samples of farmers and traders, concerned with choices, competition, margins and market structure. An attempt was made to use a snowball research method called 'follow-the-bag' as part of this enquiry; however, the marketing chains pursued proved either non-existent (due to no maize sales being undertaken) or very short (up to one or two sequential traders), so this attempt was only partially successful. Question (d) is also addressed using the econometric method of cointegration to examine the likelihood that spatial arbitrage occurs efficiently, resulting in rapid price adjustments across markets when there are supply and demand imbalances between them. The final question (e) that combines aspects of state regulation, institutions (in the North, 1990, sense of 'rules of the game'), coordination, and politics is not susceptible to statistical testing; however, it uses principles of analytical narrative and inductive reasoning that have an established position in the social science research methods repertoire (Bates *et al*., 1998; 2000).

1.3 Maize and Poverty in Malawi

There is a well-known social aphorism in Malawi that goes 'if you have not eaten *nsima* (thick maize porridge), you have not eaten' ('*ngati siunadye nsima ndiye kuti siunadye chakudya*'). While such sayings often have to be treated with caution because they may be referring to a state of affairs or a mode of working of society that no longer really applies, in this instance the saying contains more than just a small kernel of truth. The basic facts of the matter are:

(a) maize contributes 71 per cent of all calories consumed by the population of Malawi, a proportion that stubbornly refuses to decline despite long declared intentions by the government to encourage diversifying food consumption in the country;[3]

(b) some 75.4 per cent of households in Malawi are customary small farmers, and 97 per cent of these farmers grow maize on their holdings (Government of Malawi, 2005a)

(c) the consumption of maize and other cereal products corresponds to 10.6 per cent of the consumer price index in Malawi, derived from the 2004-05 Integrated Household Survey (Government of Malawi, 2005a)

Malawi has 9.4 million ha of land of which an estimated 7.7 million ha is available for agriculture (Government of Malawi, 2002 p.7). Population density is high at 139 persons per sq km of land (Government of Malawi, 2008b). The agricultural land is divided between estate areas (1.2 million ha) and customary smallholder areas (6.5 million ha). In recent years, maize production is estimated to have occupied an area of 1.5 million ha, and since maize is mainly grown in the small farm sector, the maize cultivation area therefore corresponds to roughly 23 per cent of all land under customary tenure.

The division between estate and small farm land is not made on the basis of farm size. The difference is rather one of tenure, with small farm holdings corresponding to customary allocation and inheritance, while estate agriculture is based on state leaseholds or freehold farms (Cross, 2005; Harrigan, 2008). Nevertheless, estate land tends to comprise holdings of 10 ha or more, while small farm agriculture occurs in

[3] There is quite a lot of inconsistency between different sources regarding this figure. A maize contribution to total calories of 71.3 per cent is consistent with annual per capita consumption of 172.2 kg, which seems to be the average in the 2000s used by MoAFS in the Malawi Food Balance Sheet (Government of Malawi, 2008a). This level is also consistent with the pattern of deficits and surpluses of maize production with respect to a consumption trend (see Chapter 6 below). FEWSNET uses a calorie contribution of 72.8 per cent (FEWSNET, 2007a). On the other hand Jayne *et al.,* (2008a) infer a proportion of 55 per cent from various sources.

farm sizes below this level, and for the majority a tenth or less of this level (Chinsinga, 2008). It has been estimated that 55 per cent of smallholder farmers have holdings of one ha or less (Government of Malawi, 2002).

According to the Ministry of Agriculture and Food Security (MoAFS) (Government of Malawi, 2007a), the total number of farm holdings in the customary sector is 3.06 million. However, the 2008 population census gives total households for the whole country at 2.96 million, so there seems to be a mismatch between MoAFS and NSO data with respect to this estimate. The Welfare Monitoring Survey 2008 (WMS) conducted by NSO states that the small farm sector constitutes 80 per cent of all households in Malawi (Government of Malawi, 2008c p.59). When taken in conjunction with 2008 census results, this implies 2.4 million small farm households, or 11 million people at an average household size of 4.6 persons.

According to time series data maize output in Malawi rose gradually through the 1960s to 1980s, rising from 1.1 to 1.4 million tons by the end of the 1980s (Table 1.1). Figure 1.2 compares annual output data to a 5-year moving average, the latter serving the purpose of smoothing out annual fluctuations in order to get at underlying trends. In the early 1990s, there ensued a period of high instability in estimated output, with a resumption of an upward movement to around 1.7 to 1.8 million tons by the end of the decade. In the 2000s there has been instability once again, followed by a strong surge in output dating from the 2005/06 crop season when a large scale agricultural input subsidy was introduced (on which more in Chapter 2). The later 2000s have seen output varying apparently between 2.6 and 3.6 million tons. This is well in excess of annual domestic consumption, and should imply that the country is more than self- sufficient in its staple food. However, as we shall see in later chapters, price behaviour in these latest years seems to tell a more complicated story, and it is possible that estimated production figures in some recent years do not state the true output position (Jayne and Tschirley, 2009).

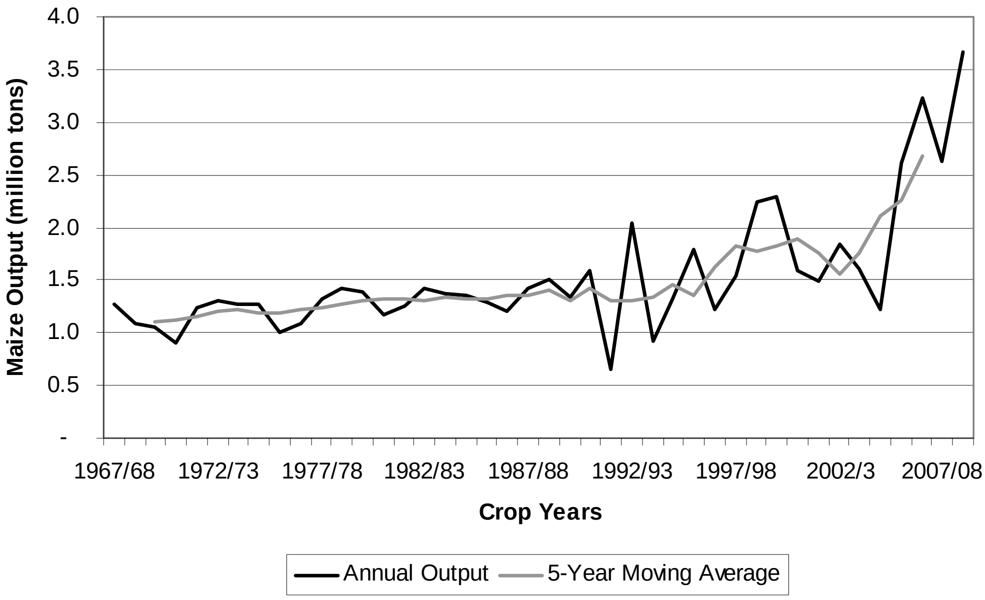
An examination of domestic maize availability per capita over this same time period conveys an interesting story. Again annual output per capita and 5-year moving average data are graphed in Figure 1.3. The Malawi population has grown from 3.9 million people at independence in 1964 to an estimated 13.4 million in 2009. The latest spot check provided by the 2008 population census was a total population of 13.066 million in that year. Overall population growth over the entire period since independence has equalled 2.8 per cent per year, with variations in different intercensal periods. The per

Table 1.1: Malawi: Basic Time Series Data on the Maize Economy

Crop Year	Maize Output (tons m.)	Maize Area (ha m.)	Pop. (m.)	Output per Capita (kg)	Maize Yield (kg/ha)
1967/68	1.27	1.07	4.29	295.7	1,187
1968/69	1.09	1.07	4.42	246.6	1,019
1969/70	1.06	1.00	4.55	233.1	1,060
1970/71	0.90	1.05	4.68	192.3	857
1971/72	1.24	1.10	4.82	257.5	1,127
1972/73	1.31	1.15	4.95	264.4	1,139
1973/74	1.28	1.11	5.10	251.1	1,153
1974/75	1.28	1.00	5.25	244.0	1,280
1975/76	1.00	1.00	5.40	185.2	1,000
1976/77	1.09	1.00	5.55	196.2	1,090
1977/78	1.32	1.15	5.76	229.1	1,148
1978/79	1.42	1.16	5.97	237.7	1,224
1979/80	1.39	0.97	6.19	224.4	1,433
1980/81	1.17	1.10	6.42	182.1	1,064
1981/82	1.25	1.20	6.66	187.6	1,042
1982/83	1.42	1.17	6.91	205.6	1,214
1983/84	1.37	1.17	7.16	191.2	1,171
1984/85	1.36	1.15	7.43	182.4	1,183
1985/86	1.30	1.19	7.70	168.1	1,085
1986/87	1.20	1.13	7.99	150.4	1,062
1987/88	1.42	1.14	8.15	174.7	1,252
1988/89	1.51	1.27	8.31	181.6	1,188
1989/90	1.34	1.34	8.48	158.4	999
1990/91	1.59	1.39	8.65	183.8	1,142
1991/92	0.66	1.37	8.82	74.5	480
1992/93	2.03	1.33	9.00	226.1	1,533
1993/94	0.92	1.13	9.18	100.1	814
1994/95	1.33	1.23	9.36	141.9	1,083
1995/96	1.79	1.21	9.55	187.8	1,488
1996/97	1.23	1.23	9.74	125.9	994
1997/98	1.53	1.29	9.93	154.5	1,187
1998/99	2.25	1.37	10.21	220.0	1,640
1999/00	2.29	1.44	10.49	218.2	1,596
2000/01	1.59	1.45	10.79	147.4	1,099
2001/02	1.49	1.51	11.08	134.0	981
2002/03	1.85	1.62	11.39	162.2	1,142
2003/04	1.61	1.62	11.71	137.4	994
2004/05	1.23	1.51	12.03	101.8	809
2005/06	2.61	1.62	12.37	211.1	1,608
2006/07	3.23	1.19	12.71	253.8	2,722
2007/08	2.63	1.60	13.07	201.6	1,650
2008/09	3.66	1.66	13.43	272.7	2,202

Source: Government of Malawi (2007a) and MoAFS Crop Estimates, with the exception of maize area 1967/68 to 1985/86 (FAO, 2009b). Population figures interpolated from NSO census figures, generally at 10 year intervals.

Figure 1.2: Malawi: Trend in Maize Output 1967/68 to 2008/09



Source: data compiled in Table 1.1

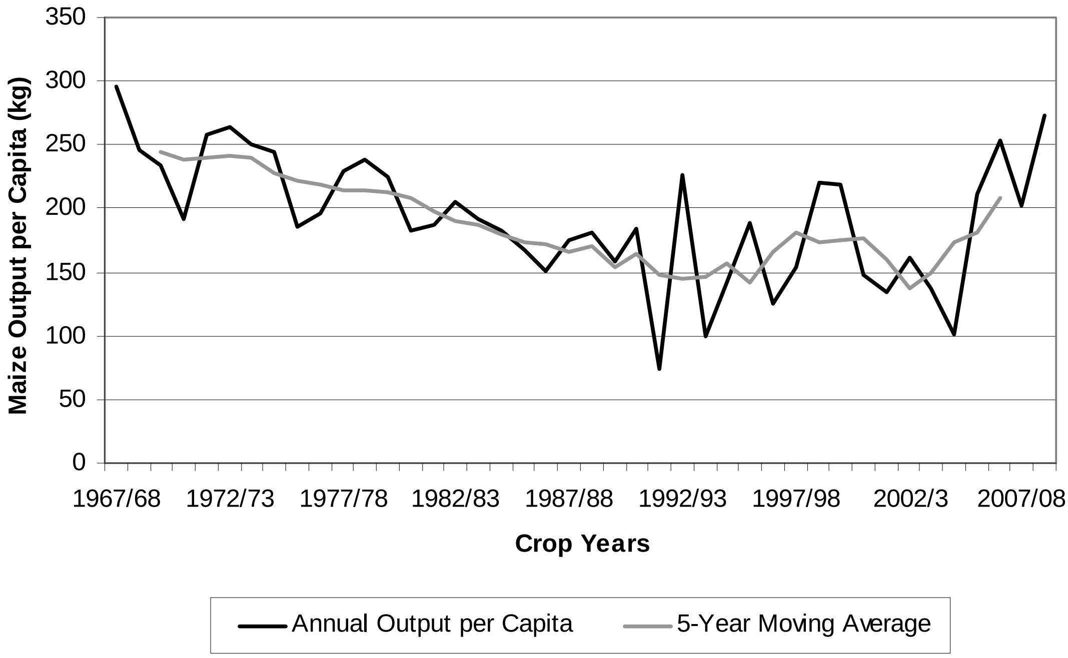
capita maize availability picture displays a declining trend from the mid-1960s to the mid-1990s, from 245 kg to 145 kg per capita, an overall decrease of 40 per cent. This is quite striking, and might suggest quite a serious reduction in dependence on maize for dietary calories, although other data does not corroborate such a conclusion, and maize imports also need to be factored into the picture.[4] Since 1995/96 per capita domestic availability has been mixed and unstable, with a strong upward burst towards the most recent period. Nevertheless, the figure of around 240 kg per capita for 2008 and 2009 remains below the equivalent figures for the mid-1960s. If true output in recent years has been less than stated (as discussed above), then per capita availability in the late 2000s will still be significantly below what it was 40 years ago. Not too much should be read into this finding, at this stage, but this factor possibly becomes pertinent later in the thesis when quite exceptionally high lean season prices were experienced in the 2007/08 and 2008/09 maize seasons.

The area in production and yields are additional important dimensions of the Malawi maize economy that it is useful to establish at an early stage in the thesis. The area in

[4] It is also probable that the quantity of maize grown for subsistence was over-estimated in the earlier years of this time-series (Kydd and Christiansen, 1982), so that early levels of per capita availability are too high.

production (Table 1.2) has averaged 1.4 million ha over the past 20 years, with some tendency to decline in the middle of this period, and to rise towards the end of the

Figure 1.3: Malawi: Trend in Maize Output per Capita 1967/68 to 2008/09



Source: data compiled in Table 1.1

period. Moving average data suggests a production area of just over 1.5 million ha in the 2000s. Of course increases in maize area also mean declines in the area devoted to other crops in a country where opportunities for expansion in agricultural land area are extremely limited. Thus efforts by policy makers to encourage a more diverse use ofland in the customary small farm sector do not seem to have achieved their aim yet. Figure 1.4 shows the yield trend in this 20-year period, again comparing annual data to a 5-year moving average. Maize yields were erratic in the 1990s, rising from around 1 ton per ha to 1.5 tons per ha, then falling back in the early 2000s based on the 5-year moving average. In 2004/05, a low average yield for that single season of only 0.8 tons is recorded (Table 1.1); however, this is followed by a doubling of yield to the following year, and subsequent estimated yields of 2.7, 1.6 and 2.2 tons per ha in 2006/07, 2007/08 and 2008/09 respectively.

The rise in estimated maize yields in recent years in Malawi represents a combination of several different factors, amongst which changes in the variety of maize cultivated play a key role. Malawi has three broad types of maize varieties and these are local, composite and hybrid maize. Local maize commonly known as *chamakolo*, is maize

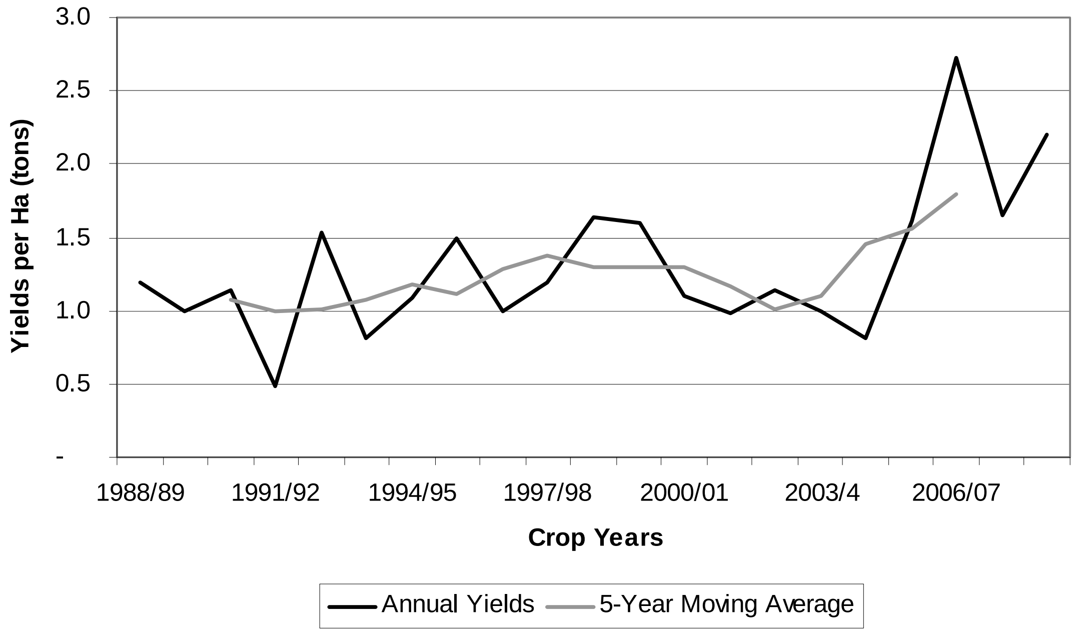
Table 1.2: Malawi: Trends in Area by Maize Varieties 1988/89 to 2008/09

Crop Year	Total	Local		Composite		Hybrid*	
	'000 ha	'000 ha	%	'000 ha	%	'000 ha	%
1988/89	1,270.8	1,160.0	91.3	25.1	2.0	85.8	6.7
1989/90	1,343.8	1,184.0	88.1	24.7	1.8	135.0	10.0
1990/91	1,391.9	1,193.6	85.8	18.9	1.4	179.4	12.9
1991/92	1,368.1	1,137.9	83.2	13.3	1.0	216.9	15.9
1992/93	1,327.0	996.8	75.1	3.9	0.3	326.4	24.6
1993/94	1,129.3	920.9	81.5	0.8	0.1	207.6	18.4
1994/95	1,225.6	859.1	70.1	2.3	0.2	364.1	29.7
1995/96	1,205.3	856.4	71.1	17.5	1.4	331.4	27.5
1996/97	1,233.5	914.5	74.1	20.3	1.6	298.7	24.2
1997/98	1,292.7	912.8	70.6	25.0	1.9	354.9	27.5
1998/99	1,369.2	767.1	56.0	45.4	3.3	509.6	40.7
1999/00	1,435.2	798.6	55.6	107.9	7.5	528.7	36.8
2000/01	1,446.3	906.4	62.7	207.3	14.3	332.5	23.0
2001/02	1,513.9	832.0	55.0	232.6	15.4	372.4	29.7
2002/03	1,617.9	767.0	47.4	277.8	17.2	457.1	35.4
2003/04	1,617.6	720.9	44.6	334.2	20.7	423.7	34.8
2004/05	1,513.9	768.6	50.8	372.7	24.6	372.6	24.6
2005/06	1,624.0	654.2	40.3	545.6	33.6	424.3	26.1
2006/07	1,185.4	164.7	13.9	555.5	46.9	465.1	39.2
2007/08	1,597.0	559.9	35.1	587.0	36.8	450.0	28.2
2008/09	1,662.5	528.7	31.8	570.6	34.3	563.2	33.9

* area figures include 'winter maize' in years when this is reported
Source: (Government of Malawi, 2007a, 2009b)

traditionally passed on among farmers. This category comprises open pollinated varieties that can be retained for sowing in successive planting seasons with little adverse effect on yields, have low yields, process easily into fine white flour called *ufa woyera* for preparing *nsima*, and are resistant to weevils in storage because of their hard starch (Smale and Heisey, 1997). Their seed production is the result of random pollination, and they can be passed on for up to three successive years without major adverse impact on yield, thereafter genetic deterioration tends to set in. Hybrids are high yielding maize varieties the pollination process of which is controlled, and in which inbred parent lines of maize are crossed to create seeds of greater yield potential than

Figure 1.4: Malawi: Trend in Maize Yields 1988/89 to 2008/09



Source: data compiled in Table 1.2

either parent. Their seed cannot be recycled because their yield vigour deteriorates fast for genetic reasons with each successive generation of seed replanted (Smale, 1993; Smale and Jayne, 2009). The hybrids also have poor 'poundability' or flour processing characteristics, because of their soft starch, which is nevertheless favoured by the industrial food sector (Smale and Heisey, 1997).[5]

Several reasons have been adduced for Malawi being slow in developing and adopting hybrid maize varieties compared to other countries in the southern African region. For example, Zimbabwe had available a first hybrid called Southern Rhodesia-1 (SR-1) released in 1949, and a second hybrid (SR-2) was released in 1960. It is thought that the non-existence of a significant settler population set Malawi apart in this respect (Smale and Jayne 2009). Also relevant from the mid-1960s to the mid-1980s was the relative neglect of the small farm sector, in favour of policies promoting economic growth through estate agriculture (Harrigan, 2001). A third factor was the small proportion of

[5] These three groups of maize varieties are also sometimes referred to as flint, semi-flint and dent maize varieties, reflecting the relative hardness of their starch.

farmers producing a surplus of maize for the market, making it difficult for most small farmers to afford new seeds and adequate fertilizer application on an annual basis (Smale and Jayne 2009). A fourth factor was the strong consumption preference of Malawi small farmers for local varieties that had good poundability, processed well into *ufa woyera*, and stored well on the farm (Smale, 1993; Smale and Heisey 1997; Smale and Jayne 2009). These four factors (lack of a significant settler population, government growth strategy through estates, lack of cash for inputs, and farm families' preference for local maize) combined to discourage investment in maize genetic research specific to Malawi. The first semi-flint hybrids like MH18 with processing and storability characteristics acceptable to smallholder farmers were not released until 1990 (Smale and Jayne, 2009).

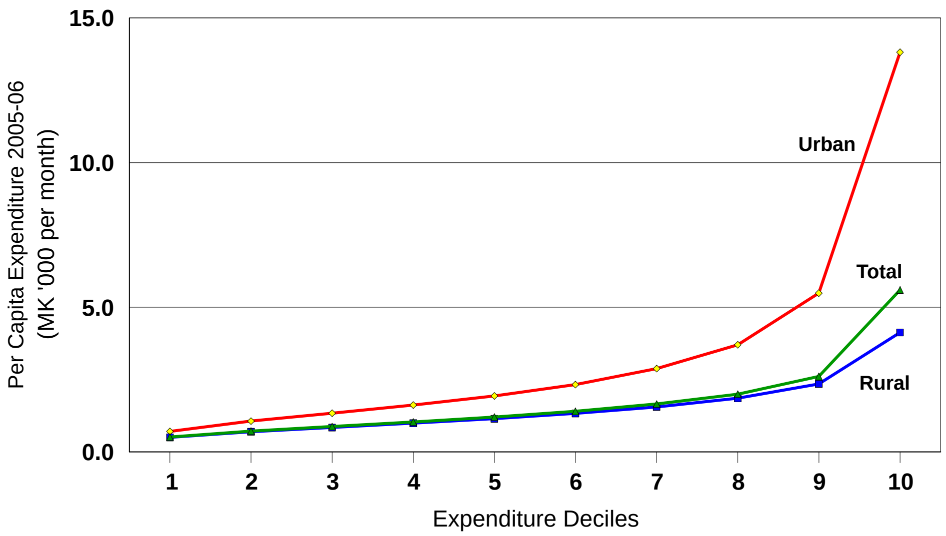
As shown in Table 1.2, the share of maize cultivation devoted to local varieties declined only gradually and erratically from the late 1980s to the late 1990s, after which an accelerated adoption of composite and hybrid varieties took over. The majority maize cultivation remained under local varieties until the 2002/03 crop season. The areas under composite varieties remained very low indeed until the late 1990s, but this has grown rapidly in the 2000s and now corresponds to a third of the cultivated area. The fortunes of hybrid varieties differ again from the other categories. Here there was some success in persuading farmers to shift into hybrids in the early 1990s, but the proportion of maize area under hybrids then stagnated at around 27-28 per cent for many years until the mid-2000s, when their use jumped upwards in connection with the introduction of the Agricultural Input Subsidy Programme (AISP) in 2005/06. Currently, the three categories of maize varieties correspond roughly to one third of the cultivated area each, with hybrids apparently on the rise, and in all likelihood local varieties will continue to diminish in importance. A combination of the rising uptake of hybrid varieties and greater use of improved inputs under the AISP (as well as fortuitous rainfall) has resulted in the significant gains in maize yields noted for the second half of the 2000s.

Malawi is an exceptionally poor country. The most recent full household income and expenditure survey conducted in 2004/05 (Government of Malawi, 2005a) yielded a poverty estimate of 52.4 per cent and an ultra-poverty estimate of 22.4 per cent.[6] The

[6] This was the second Integrated Household Survey (IHS2). Subsequent partial surveys conducted in 2007 and 2008 (Welfare Monitoring Surveys) suggest a fall in poverty and ultra poverty since 2005. The WMS 2008 estimated rates for these poverty measures of 40 per cent and 15 per cent respectively in 2008 (Government of Malawi, 2008c)

ultra-poverty line is set at a level representing the cost of a minimum acceptable level of calorie consumption, and is therefore sometimes referred to as the food poverty line. This means that anyone measured as falling below this line does not gain enough income even to satisfy basic nutritional requirements, let alone secure other basic needs. Malawi is a poor, but also unequal country. The gini coefficient of inequality for per capita consumption expenditure at 0.39 is fairly average by international standards; however, urban inequality with a gini coefficient of 0.48 is high, and there are big disparities between urban and rural incomes as shown in Figure 1.5. Based on mean per capita consumption for each decile of the population the graph shows for the country as a whole, and for rural areas separately, that the bottom 60 per cent of the population have little separating them in terms of material standards of living. Indeed, in rural areas, only US$1.8 per capita per month separates each decile from the first up to the sixth decile (Ellis, 2010). However, the towns are a lot less poor, and a lot more unequal, than the rural areas. It is thus that Figure 1.5. displays a steep rise in mean decile per capita incomes at the top of the income distribution led by urban inequality, with this rise being much less marked for rural areas taken on their own.

Figure 1.5: Malawi Rural, Urban and Total Income Distributions, by Decile



Source: Ellis and Marchetta (2009) based on data from Government of Malawi IHS2 2004-05

A great deal has been written about vulnerability in Malawi, understood as meaning 'vulnerability to hunger' rather than any other type of vulnerability (Devereux, 1997; 1999; Government of Malawi and World Bank, 2006). In this context vulnerability means a combination of both being exposed to risk and shocks, and not having the ability to deal with such shocks when they occur. Shocks can be divided between personal adverse events (illness, death, accident, theft etc.), sometimes called idiosyncratic shocks, and society-wide events of catastrophic magnitude (drought, floods, crop and livestock diseases). In a very poor country like Malawi, most families face a combination of such shocks on an ongoing basis (Dercon, 2002; 2005). Families can deal with shocks, up to a point, by drawing down on assets (including social assets of community and kinship) (Corbett, 1988); however, this is a destructive process, and successive shocks can mean that previously viable households are driven into chronic poverty and vulnerability. One reason that fairly minor fluctuations in agricultural outcomes seem to result in hunger on a wide scale in the 2000s is this erosion over time in previous asset buffers.

In summary of this background sketch of the maize economy, several key features can be emphasized. One is that Malawi's 'dependence' on maize on the production side has barely diminished over 30 or 40 years, and indeed in terms of crop area may be rising in the most recent era. A second is that almost all time series manifest considerable variability in annual outcomes and provide evidence of 'shocks' i.e. years when either yields, or area, or a combination of both have resulted in unusually low output. This annual output variability causes considerable distress in the rural economy, especially for the large proportion of food deficit farm households. It also has a potentially strong influence on price instability, depending in part on storage and trade (import or export) influences at the aggregate level. A third is that despite recent successes in production, per capita maize availability from domestic production may not be as high in the late 2000s as it was in the late 1960s.[7] This may not matter, since it is to be expected that diversity in consumption will have increased somewhat over this period, due in part to urbanisation and in part to rising living standards for at least some of Malawi society. The precise levels and magnitudes of change represented by the time series data need to be interpreted with caution. Crop area and yield estimates in a poor country are an inexact science, and politics can enter this domain just as it does in many other aspects of the maize economy of Malawi.

[7] Subject to the caveat given at footnote 3 above.

1.4 Structure of the Thesis

The intention of this chapter was to set up the thesis. The objective of the thesis is to explore price instability in the Malawi maize market. The reasons for this focus are put forward. The chapter provides background on the significance of maize for food security in Malawi, and on the evolution of events in recent history that make seasonal price instability a critical policy problem. In addition to verifying the degree of price instability, the thesis also explores plausible causal factors for its persistence, and provides evidence of its own that contributes to an ongoing debate and discussion about the functioning of the maize market in Malawi.

The main literature review for the thesis is in Chapter 2. The chapter summarises literatures on price seasonality as a problem in food markets, the policy responses that historically and contemporarily have been used to ameliorate price seasonality, and the history of maize market regulation in Malawi. Chapter 3 describes the research methods deployed in the thesis. It covers, first, the method that is used to analyse seasonal price formation in maize and other food crop markets in Malawi. It then describes the methods and fieldwork sites of the component of the thesis concerned with examining competition and conduct in contemporary maize marketing. Third, it summarises the methods of cointegration and analytic narrative that are specific to certain parts of the thesis. Finally, it summarises other methodological issues surrounding the formal (government) collection of maize market data in Malawi that can help to interpret the accuracy of important data series such as output, yields and prices.

The time series analysis of price seasonality in maize and other food crop markets is presented in Chapter 4. This chapter centres on the measurement of seasonality in the maize market and how the degree of seasonality has evolved over a twenty year period from 1989 to 2009. Price seasonality in different maize markets across the country is compared, and the results for maize are compared with those for other key food crops, since differences between crops with respect to whether and in what direction price seasonality has been changing over time, raise interesting issues for plausible different explanations of the maize market findings. The statistical analysis conducted in this chapter has not hitherto been done for Malawi, to the knowledge of the author, and it constitutes the principal claim of the thesis to making an original contribution to our understanding of evolving maize market behaviour in the country.

Chapter 5 presents findings in relation to three aspects of maize market functioning in Malawi that were explored in the research, and that contribute to the understanding of the relative importance of different factors in explaining the maize price seasonality findings. The first such aspect is the conduct of the maize market, especially in terms of competition in marketing at the farm-gate level, in relation to which fieldwork research in three different sites was conducted. The second aspect concerns the structure of the market in terms of traders and buyers of different sizes, playing different roles in the time, space and form functions of vertical marketing chains between the producer and final consumer. The third aspect concerns maize price transmission across geographical space, for which time series price data at different locations is used in order to examine the degree of spatial market integration, using cointegration methods.

Chapter 6 examines three episodes of extreme seasonal price instability that occurred in Malawi in the 2000s, in 2001/02, 2005/06 and 2007-09 (the latter across two crop seasons). The chapter begins by examining these three episodes in terms of the price behaviour they display, and with a view to comparing similarities and differences between them. It then considers the maize supply factors that contribute to explaining such extreme price volatility, partly through the maize balance sheet for the 2000s, and partly through events and trends in stock holding and external trade in maize. Next, the chapter studies these three episodes in narrative form, paying particular attention to the actors and institutions involved, and the political factors influencing the timing and direction of public responses to emerging maize market imbalances. The chapter draws together patterns of experience that are common to all such price crises, and points the way towards the private-public coordination problem that lies at the heart of malfunctions in maize policy in Malawi.

The conclusions of the thesis are presented in Chapter 7. This chapter summarises the findings of the thesis, distinguishing those findings that emerge directly from a statistical process of verification, from those that depend more on interpretation amongst plausible alternative explanations and arguments. The chapter returns to some of the key contemporary debates about the working of food markets in countries like Malawi, and suggests ways that the findings of the thesis support or detract from critical arguments found in the recent literature. The chapter also considers a recent framework that has been suggested for getting more purchase on the public-private coordination problem, and distinguishes aspects that arise from the thesis for which such a framework seems a helpful way forward.

Chapter 2 : Food Price Seasonality, Policy Responses and Maize Market Regulation in Malawi

2.1 Price Instability in Food Markets and Policy Responses

As already established in Chapter 1, price instability in food markets has existed from the moment that producers and consumers of food became separate from each other, and markets came into being to facilitate the transfer of food from producer to consumer in the context of a cash economy. Price instability originates in the seasonality of agricultural production, especially for annual crops; in production characteristics of food; and in the low price elasticity of demand for food (Kahlon and Tyagi, 1983).

Seasonality by itself is the cause of a significant proportion of the instability in food and other farm prices (Timmer, 1980; 1989). In the case of an annual crop, a single harvest season occurs causing a high volume of sales to flood the market. This effect is ameliorated somewhat if the crop can be readily and successfully stored for later sale. On the other hand, own crop storage by farmers is prone to losses or reduction of quality in store for a variety of reasons (to which we return shortly), so other agents typically mainly carry out the storage function after farm gate sales have occurred. In principle, the price difference between the lowest harvest price and the peak price before the next harvest, known as the storage margin (Goetz and Weber, 1986; Siamwalla, 1988), should equal the competitive cost of providing storage. However, this depends on the competitive and efficient working of private trade, and can be upset by risks and shocks that cause more speculative storage behaviour to occur.

Price instability also arises importantly from the feature of agricultural production whereby farmers make their planting decisions based on prices obtained on the past harvest, with a considerable time lag (typically 6-8 months for grains) between planting and the next harvest. This feature can result in price behaviour known as the cobweb theorem, whereby prices oscillate from one harvesting season to the next depending on whether farmers expand production due to previous high prices, or contract production due to last season's low prices (Tomek and Robinson, 1981: Ch.9). The cobweb effect is a real, not just a theoretical occurrence, and is commonly observed in short season horticultural crops like carrots, tomatoes or onions; and equivalent short cycle livestock production such as the fattening of pigs (e.g. Harlow, 1960). Its potential presence in annual food staples is obscured by government policies that aim to avoid such occurrences, in both rich and poor countries.

Depending on supply and demand characteristics, cobweb cycles can converge towards a long run equilibrium price, or be subject to increasingly violent price swings, or indeed behave somewhere between these alternatives. The comparative statics of these outcomes are provided in Tomek and Robinson (1981, pp.184-5). Essentially if supply is less elastic than demand, then the successive quantity and price adjustments converge; if supply is more elastic than demand then successive quantities and prices diverge; and if supply and demand are roughly similar in their responsiveness to price, a constant amplitude cycle results. These processes are, of course, highly stylized in comparative static models, and real world price cycles are unlikely to correspond to the theoretical behaviour except in rare instances.

The other important production characteristic of food that contributes to price instability is natural variation in harvest outcomes from one season to the next or one annual cycle to the next. Harvests can vary for all kinds of reasons, aside from catastrophic scenarios such as droughts or floods. Relatively minor variations in the seasonal pattern of rainfall or temperature (including both maximum and minimum temperature), as well as varying incidence of crop pests and diseases, can cause harvest volumes to vary from one year to the next, with consequent effects on average annual price levels. These cyclical price effects are superimposed on the within-season price behaviour, and may have the effect of amplifying or dampening down seasonal price instability.

The final reason for price instability in agricultural markets is to do with the character of the demand for food. When a food crop is the chief dietary staple of a population, there is a strong consumption preference towards that food, and there are few alternative sources of dietary energy, then the price elasticity of demand for that crop is generally under 1, and may be as low as 0.2 to 0.5 (Bond, 1985; Haggblade *et al.,* 2008).[8] If we take a demand elasticity of 0.5 as an example, then a 10 per cent rise in price only reduces the quantity demanded by 5 per cent. Conversely, this means that a 10 per cent shortfall in supply will invoke a 20 per cent rise in price. Thus, a low price elasticity of demand coupled with variations in the harvested volume of a staple food crop is a recipe for big price fluctuations.

[8] Strictly the demand elasticity is a negative number since it refers to the decline in quantity caused by a rise in price (or *vice versa*); however, it is conventional in this sort of discussion to ignore the negative sign on the elasticity, which is taken as understood.

In fact, when the majority of farmers are small-scale staple food producers, mainly consuming what they produce, the price instability that results from this circumstance can be even stronger than is suggested in the above simple calculations. This is because the variation in supply made available to consumers is considerably greater than the underlying variation in production (Hayenga *et al.*, 1978). Say, for example, two million tons of staple grain is produced in a normal or average year, and 80 per cent of this harvest is retained for self-consumption by the farmers that produce it. So 20 per cent or 0.4 million tons is sold in the market to other consumers. Now, if there is a 10 per cent fall in harvest in a particular year, but producers continue to maintain their level of self-consumption, then production is 1.8 million but only 0.2 million will be offered for sale to consumers. In other words, there is 50 per cent fall in market supply, leading to the possibility of 100 per cent rise in the price, assuming the same demand elasticity of 0.5 as in the previous calculation.

Of course, no one is pretending that this is exactly what would occur in a country with a high ratio of semi-subsistence producers, strong preference for a single staple food, and inelastic demand. Some farmers would adjust their self-consumption in the light of steeply rising prices, offering more to the market, and a proportion of consumers would modify their consumption, perhaps moving away from their preferred staple to other alternatives. Thus, the price instability scenario might not be quite as drastic as suggested in the simple example. Nevertheless, this example has some considerable force for a low income country typified by Malawi with its great dependence on maize. It demonstrates that very basic, yet very powerful, economic forces can militate in the direction of a propensity towards high price instability in the basic foodstuff that is critical to the welfare and wellbeing of the majority of the population. The particular way these forces manifest themselves in the context of state regulation of the maize market in Malawi is at the core of this thesis, and the examination of maize price instability and its control and consequences is the preoccupation of the narrative in this and later chapters.

Corresponding to the basic analytics of price instability, there is a parallel well trodden path concerning its welfare implications and the legitimacy of state action to reduce or eliminate it. In this, overall instability, which, as we have seen, can comprise both seasonal and cyclical elements needs to be considered separately from pure seasonal effects, since the latter pose a narrower set of challenges for policy, and are especially connected with the function of seasonal crop storage.

Going back many decades, economists have debated the welfare implications of price instability for producers and consumers, and have tried to deduce principles for policy arising from these impacts. The simple analytics involve partial equilibrium analysis (see Schmitz, 1984 for an excellent account). Early contributions to this discussion argued that policy intervention should be avoided. Waugh (1944) offered a partial equilibrium analysis of the demand side of price instability, and concluded that stabilising prices at the mid-point between two outcomes caused by variation in supply would result in a welfare loss, using consumer surplus to measure gains and losses.[9] Some 17 years later, Oi (1961) offered an equivalent analysis of producer welfare resulting from shifts in demand, and likewise concluded that price stabilisation midway between two price outcomes would reduce producer welfare. The descriptive interpretation of these findings was, in the demand case, that consumers could buy more of the commodity when prices were low, and less when prices rose, resulting in an overall net gain in the presence of unstable prices. In the supply case, producers gained more by selling a lower harvest at a high price, and a higher harvest at a lower price, than if they had sold the two harvests at the mean price.

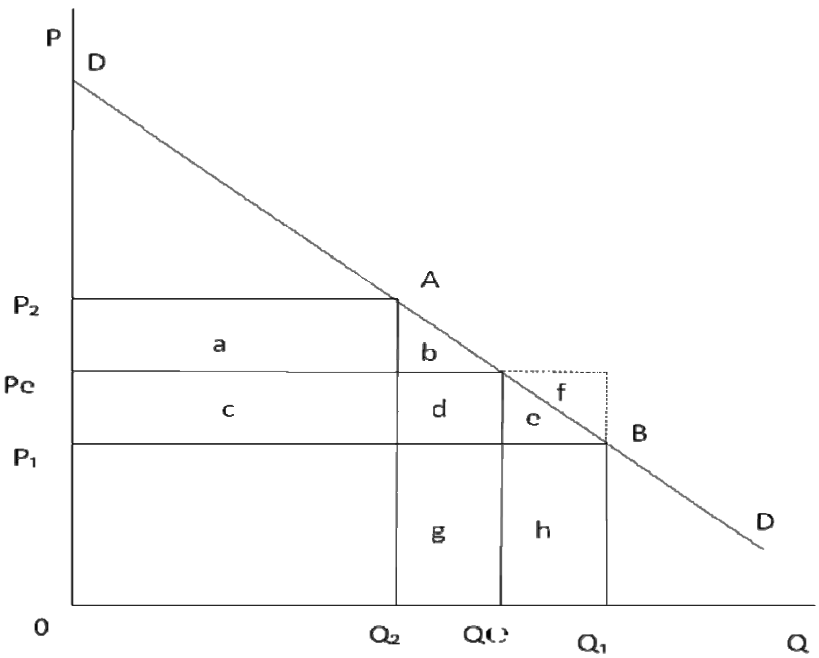
Interestingly, it was not for another eight years before Massell (1969) produced a joint producer and consumer analysis that showed price stabilisation at the mid-point in the presence of supply shifts caused a producer gain that outweighed a small consumer loss, thus resulting in a net overall gain in welfare from price stabilisation. This analysis remained the accepted wisdom, with embellishments, for many years, and constitutes the partial equilibrium analysis of price stabilisation offered by Ellis (1992: Ch.4) which is reproduced below (Figure 2.1). In this figure, the intersection between supply curves (not shown) and the demand curve oscillates between point **A** and point **B**. A buffer stock is assumed to operate to keep the price at its target level of P_e and welfare and resource changes are as follows:

Buffer stock operations cancel out:		**d + g = e + f + h**
Consumer surplus loss:	**d**	(because c + e = a + b)

[9] See Ellis (1992: Ch.3) for an exposition of the use of consumer surplus to measure changes in producer or consumer welfare in the framework of partial equilibrium analysis.

Producer surplus gain:	**d + e + f**
Net welfare gain:	e + f (accrues to producers)

Figure 2.1: Welfare Effects of Price Stabilisation



Source: (Ellis, 1992 pp.85)

This same conclusion is accepted as correct in its simple formulation in the major work on commodity price stabilization written by Newbery and Stiglitz (1981). However, the model as it stands has costless buffer stock operations, and ignores the role of private stocks in carrying forward food supplies from surplus to deficit seasons, for which a storage margin is required. After going through a great number of variations in plausible assumptions about the way food markets and private and public stocks work and interact, the latter authors conclude firmly that stabilisation is an undesirable policy goal:

> "The major result of our analysis is to question seriously the desirability of price stabilization schemes, both from the viewpoint of the producer and of the consumer." (*Ibid*. Ch.3, p.23)

The Newbery and Stiglitz (1981) conclusion tends to be regarded in the literature as the definitive argument against stabilization based on microeconomic theorising, and ignoring macroeconomic and social effects of price instability. However, most of the early literature remained locked into fairly abstract assumptions about markets that bear little relation to how they work on the ground, and especially on how they work for different types of producer and consumer with varying farm sizes and annual incomes. The part of Newbery and Stiglitz that remains very much alive as a policy debate today is the recognition that private storage carries out a socially useful function in inter-temporal food supply across seasons; and that if such private storage were working competitively and efficiently, reflecting just the cost of storage between low and peak price seasons, then the role of public buffer stocks essentially vanishes.[10] This conclusion is reinforced if imports are freely permitted to balance the annual market in the event of gap between domestic production and consumption. However, this is jumping ahead, some more on storage first.

It was remarked earlier that the grain storage capability of small farmers themselves tends to be quite limited, and is prone to disadvantages that mean that farmers are most unlikely to hold more grain than they require for family consumption purposes. In particular, family granaries are prone to moisture deterioration, infestation by weevils, and damage from vermin (and, in some cases, theft as well). In addition, most farm families arrive at the harvest season with cash resources severely depleted, or indebtedness to lenders or input supply agencies that need to be repaid. For these reasons, the marketed surplus of a staple grain like maize tends to be sold at harvest time, and a proportion of these sales represent distress sales in order to recover from debt or purchase non-food basic needs. This means that the inter-seasonal storage of the marketed surplus tends to be undertaken primarily by traders (or by the government), and not by farmers.

The economics of storage is an interesting topic in its own right, and one that can get quite complicated (see Brennan, 1958, for an original contribution). In the context of this thesis, with its focus on seasonal price instability, storage plays the time transformation role in the marketing system that converts availability of the food at an initial time period into its availability for sale at a later date (Goetz and Weber, 1986). The agents that carry out this time function need to be recompensed for the costs they incur in doing so. These costs comprise, primarily, the opportunity cost of the cash resources tied up in the value of the stock, together with operational costs of the storage

[10] This is in relation to the pure inter-seasonal storage function, not in relation to other objectives such as acting as a strategic grain reserve for food security purposes.

facility, and a competitive net margin. By far the largest of these is the opportunity cost of capital; however, operating costs are not negligible if the quality of the product in store is properly maintained, and losses in store are minimised. Under competitive conditions, speculative stock holding (or 'hoarding' as it is typically called) cannot occur unless serious unexpected events open a window of opportunity to do so (such as evidence of an impending harvest failure). This is because no single storage agent could risk holding grain beyond the price rise that other storage agents regarded as acceptable, since they might then end up having to sell at a loss (Siamwalla, 1988).

From the latter description, it can be seen that a public buffer stock might interact in damaging ways with the private storage function. The public buffer stock might operate with a purchase and sale margin that is narrower than private operators can operate within; or it may bid up the cost of purchasing stock; or unexpectedly reduce selling prices by disposing of substantial supplies on the market. It may also have preferential access to imports (that help it to do all these things), and obtain a government subvention to enable it to cover any losses. For this reason, and this is a topic to which we return in due course, the public-private relationship in inter-seasonal storage can only work within strict and transparent rules governing public action, for otherwise it raises the level of risk confronted by private stock holders, and inhibits a competitive private market in storage from emerging (Jayne *et al.,* 2006). A fundamental precept for a workable public-private relationship in food crop storage is that the public storage margin is wide enough for private storage to earn a competitive return to investment. This means mandating the public storage agency as buyer and seller of last resort, rather than as the principal agent carrying out the inter-seasonal storage function.

Returning now to some important factors that were missing in earlier theoretical work on food price instability, one of these is risk; another is the differential impact of prices of different levels on producers and consumers of different farm sizes and income levels. Newbery and Stiglitz (1981) incorporate risk in their buffer stock models, but as an aid to understanding private decisions about buying, selling and storing commodities, and public-private storage interactions, not in relation to agricultural growth. In the agricultural development literature, risk has been generally regarded as a bad thing, inhibiting optimal farm decision making and the adoption of new technologies for agricultural growth (Lipton, 1968; Binswanger, 1980; Hazell *et al.*, 1986; Walker and Jodha, 1986; Ellis, 1993, Ch.5). Since price instability adds to risk, it is possible that the strategic argument swings in favour of stabilization once the detrimental impact of risk on agricultural growth is taken into account (Timmer, 1989).

Summarising available evidence on the production side, the World Bank (2005, p.26) concludes that the efficiency losses of price instability are quite small, typically under 2 per cent. On the other hand, there is widespread agreement that price instability has adverse welfare implications for poor consumers, and these damaging effects are intensified for the poorest and most vulnerable consumers (*Ibid.,* pp.26-7). Myers (2006) shows that for food insecure households i.e. those that persistently face a 'food entitlement gap', a rise in price above a certain threshold has adverse consequences that go far beyond any calculation of loss deriving from simple welfare analysis. This is because beyond a certain point rising prices will cause a reduction in food consumption, nutritional impairment (especially of children), hunger, starvation and possibly death. In addition, poor nutrition adversely affects the ability to work, and, for children, causes lifelong impairment to their productive capabilities (Dercon, 2005).

Despite the ambiguity of the pure microeconomic case for stabilisation (Newbery and Stiglitz, 1981), the mainstream policy response to price instability from the 1950s to the 1980s was to seek to contain instability within narrow bounds, or even to seek to eliminate it with fixed prices to producers and consumers. The general historical outlines of this are well-known and are not pursued in enormous detail here. The specifics of the Malawi case to be detailed later provide an example that reproduces many of the salient features common in sub-Saharan Africa in that historical period.

As a generalisation, price policy in Asia, including in the populous countries of India, Bangladesh and Indonesia followed the route of price stabilisation using buffer stocks (Cummings *et al.*, 2006). In this the government owns a buffer stock authority, the task of which is to ensure that the prices of one or more strategic crops remains within a range established by a floor price for producers and a ceiling price for consumers. These prices were (or sometimes continue to be) announced in advance of the next crop season. As producer prices in the market decline at harvest time towards the floor, the buffer stock authority moves to purchase all grain offered to it at the floor price. This grain is then stored in a countrywide network of warehouses or silos, ready for release in the deficit season before the next harvest if consumer prices threaten to breach the ceiling level. With minor variations in implementation this was the approach taken in the past in India (Kahlon and Tyagi, 1983), Bangladesh (Ahmed, 1988), and Indonesia (Timmer, 1986a; Ellis, 1990).

Buffer stocks generally seemed to work adequately, and the critical literature on their functioning is a lot more muted than the equivalent literature regarding marketing boards and parastatal crop authorities in Africa. Indeed, some agricultural development commentators with otherwise impeccable economic liberalisation credentials nevertheless on balance considered that buffer stocks did a good job (Timmer, 1986b; 1989).[11] There are several reasons for this. An important one is that buffer stock operations do not suffocate private trade, they merely restrict the decision making flexibility of private traders within certain parameters. Provided the rules are understood, and are adhered to by the government side, then private traders operate freely within the price band set, and are free to either sell to the government or buy from the government when prices are in the vicinity of the boundaries of the range. In general, under such arrangements, price stabilisation is achieved by the buffer stock authority handling around 5 per cent of total production (Timmer, 1986a).

It is of course critical for this relative success that the price range is pitched at a level and width that corresponds to parity pricing criteria, and that allows private traders scope to operate within the band. In addition, adjustments to the official price levels need to be made to take account of inflation, for otherwise returns to producers and other actors in that commodity market are squeezed compared to other sectors that are able to adjust freely to changing prices. Finally, the ability to use imports to help defend the ceiling price is essential, otherwise in a deficit market prices will spiral out of the prescribed range, and depleted public stocks will make it impossible to prevent this from happening.

Buffer stocks are of course not entirely free of the adverse attributes that have tended to attract so much critical analysis regarding the execution of price policy in Africa (Cummings *et al.*, 2006, p.201). The ownership and maintenance of a countrywide network of grain storage facilities is an expensive undertaking that in all cases ends up requiring support from the government in order for buying and selling operations to proceed within plausible limits of price variation. In other words, it is virtually

[11] A number of benefits of stabilisation in the Asian case are identified by Cummings *et al.,* (1986) including risk reduction for producers, and avoidance of shocks for both producers and consumers.

impossible in practice to make public stock operations self-supporting financially, and recognition of this was one of the principle reasons that Newbery and Stiglitz (1981) came out so definitively against this policy approach. In addition, public buffer stock authorities in Asia like their counterparts in sub-Saharan Africa are prone to similar (in kind, if not in degree) governance, incentive and efficiency deficits leading to waste and mismanagement and rent seeking behaviour on the part of their officials.

In Africa, a different trajectory was followed over the same historical period, often connected to organisational arrangements that were put in place in the colonial period, in some cases to protect the economic interests of settler farmers (Jones, 1972; Whetham, 1972). In Africa, the typical organisational form was the marketing board, and the typical price policy approach was to set fixed prices (rather than a price band), and to make such fixed prices pan-seasonal and pan-territorial in scope and coverage. In order to defend a fixed price, the marketing board then needed to assume monopsony powers over crop purchase, for otherwise varying prices across space and time would occur due to the separate operations of private traders. While there were evident variations between different countries, and indeed between different regions in Africa, the mainstream model was for marketing boards gradually to accrue ever more substantial powers. In some instances they became responsible not just for executing price policy but also for delivering inputs and credit to farmers, providing research and extension for the crops for which they were responsible, and operating strategic food security reserves in the case of food crops. These expanded crop authorities were (and still are in many cases) the ‘crop parastatals’; meaning that they were semi-autonomous agencies of the state, possessing considerable powers to act independently of ministerial interference, but nevertheless subject to overriding control by government, especially with respect to price level decisions and budgetary allocations (Mellor and Ahmed, 1988).

The monopsony purchasing powers conferred on crop parastatals essentially meant that private trade was banished to the peripheries of the marketing system for individual food or export crops. In some cases, this exclusion of private traders was strongly politically motivated due to the pre-independence dominance of non-indigenous ethnic groups in trading and exchange. The minor participation of private trade shrivelled to the unrecorded transactions that occur in village markets, especially just after harvest, but otherwise supplies were mandated to be sold to the parastatal authority, and practically the only source of food grain in the lean season was by purchase at official outlets of the same parastatal.

A very substantial literature exists on the emerging flaws of African food crop parastatals in the period up to the mid-1980s (World Bank, 1981; Ellis, 1983; Harvey, 1988; Mellor and Ahmed, 1988; Krueger, 1992).[12] They were found in numerous studies to have depressed real prices to producers and widened marketing margins, mainly to secure their own expansion, rather than consciously to deliver a financial surplus to government. Indeed, financially, the reverse was the case, with advances for crop purchases never being repaid, and cumulative indebtedness to publicly owned banks being prevalent. The eventual size of such organisations meant that the true unit cost per ton of produce handled through the marketing system tended to be exceptionally high for a vertical crop marketing margin. In addition, they often delayed payment or even failed to pay farmers for their sales, allowed grain to deteriorate to the point of being inedible in store, and were haphazard in their provisioning of deficit areas in the advent of food shortages. It seems plausible, although difficult to test, that the 'retreat into subsistence' that has to a greater or lesser extent characterised the behaviour of small farmers in many African countries over the past thirty to forty years began in the parastatal period, for the rational reason that the marketing system could not be relied upon to deliver either a reliable sales outlet or a source of food in difficult times.

In relation to price instability, the crop parastatal approach was broadly successful at keeping prices to producers and consumers stable, but at exceptionally high cost, as suggested in the preceding paragraph. Nevertheless, 'hidden' price instability at local and remote levels, may have been greater than is really known for that era, from official data. Certainly, in some countries, so-called parallel markets were found to be stronger than previously thought when researchers started to investigate them in detail in the early 1980s, and they were typically found to involve significantly higher prices for both producers and consumers than officially designated price levels, especially in the food deficit season (e.g. for Malawi, Christiansen and Stackhouse, 1989, p.734; for Tanzania, Ellis, 1988).

[12] For a view that identifies positive features in the coordination capabilities of parastatals see, for example, Dorward and Kydd (2004, p.352)

From the early 1980s, the well-known shift in thinking towards liberalised markets occurred, and in Africa this took the form of structural adjustment lending allied to conditionalities that pressured governments to dismantle previous state controls. At this time previously well-established 'market failures' in low income agricultural sectors were juxtaposed to widespread evidence of 'state failures', and the balance of the argument shifting decisively against state controls (Ellis, 1992, Ch.1). Liberalisation proceeded in different patterns in different countries from the early 1980s onwards. Nevertheless there were sufficient commonalities for the process as a whole to be treated as a single shift in policy sentiment. The typical liberalisation sequence began with a sharp currency devaluation, subsequent market determination of the exchange rate, elimination of import quotas, reduction in import tariffs, a tightened monetary policy and pressures towards fiscal discipline. A second wave of reforms tackled controls in specific markets more directly, occurring from the mid-1980s to mid-1990s. It is here that subsidy removal on farm inputs, and opening up of crop marketing to competition from the private sector were key policy targets of policy change (Commander, 1989; Cornia and Helleiner, 1994).

However, by the mid-1990s, perhaps a decade or 15 years into the 'reform process', a marked disenchantment with its prescriptions began to be expressed (Gibbon, 1992; 1996; Engberg-Pedersen *et al.*, 1996). On the agricultural production side, price and output gains from liberalisation seemed fragmentary and often short-lived, and some low income African countries were seen to experience more frequent food security crises than had occurred in the era of extensive state controls. A deterioration in the efficacy of public services to agriculture, such as extension and veterinary services, could be widely observed in many countries. Fertilizer use declined, especially amongst the small, poor, semi-subsistence, food crop farmers, exacerbating the seasonal food deficits to which they were anyway prone.

In this period of rising structural adjustment scepticism, divergent views began to emerge regarding the way forward for agricultural policy. One powerful critique, taking the new institutional economics as its conceptual starting point (Williamson, 1985; North, 1990) emphasized the extreme weakness of private delivery of marketing and other services to farmers, in the presence of high transaction costs, high risk, low trust, moral hazard, and missing markets (Dorward *et al.*, 1998; Kydd *et al.*, 2002). In other words, the SAP approach seriously underestimated a variety of difficulties attendant on the market successfully assuming the delivery and coordination roles previously assigned to state agencies.

One aspect of this is the problem of missing markets. Markets do not even come into existence unless the risk adjusted returns from a potential transaction outweigh the cost (de Janvry *et al.*, 1991; Dorward *et al.*, 2004a; 2005b). Secondly, and partly as a consequence of the missing market problem, there is no guarantee that the private sector will operate evenly or consistently across geographical space, or across farmers of differing capabilities at producing output surplus to their own consumption needs. Thirdly, the optimal delivery of some services to farmers requires coordinated action to be effective, for example, inputs and the credit for their purchase need to be simultaneously available. Coordination represents a special class of problems where state facilitation is needed to achieve desired outcomes even if the private sector is chiefly responsible for delivery (Kydd and Dorward*,* 2004; Dorward *et al.*, 2005b; Poulton *et al.*, 2006a).

Coordination takes on several different meanings and levels in this literature (Dorward *et al.*, 2009a; 2009b). At a basic level, a single transaction represents a coordination problem between buyer and seller. The more difficult this coordination is to achieve (due to lack of trust, absence of quality standards, ill-defined property rights etc.) the higher the transaction costs incurred, and the less likely that markets function predictably and efficiently. Second, there is the problem of missing complementary investments when no single actor is prepared to invest in new capacity (e.g. a storage facility) if other actors fail to invest in complementary products or services (e.g. increased yields by farmers; improved rural roads). Third, there is coordination between complementary services of the kind noted in the previous paragraph(for example, inputs and credit). Fourth, there is coordination between the state and the private sector, in which the absence of consistency, rules and trust can result in breakdown that exacerbates the weak functioning of markets.

The policy message that emerges from these ideas is that purely market solutions are unlikely to provide a conducive environment for renewed and sustained agricultural growth. Rather a role for the state remains necessary to facilitate the gradual reduction in transaction costs involved in agricultural service delivery, and to help solve coordination failures, as well as to address gaps in private coverage. The extent of public intervention in Asia at the time of the Green Revolution is invoked in support of this conclusion (Dorward *et al.,* 2004b).

An alternative interpretation of events and outcomes over the past two decades is that the liberalisation project was only ever partially followed through by governments, and substantively represents unfinished business (Kherallah *et al.*, 2000; Jayne *et al.*, 2002). In this view, many African governments liberalised agricultural markets grudgingly and fragmentarily, with backsliding and unpredictable reversals in policy stances (e.g. for Tanzania see Cooksey, 2003). In output marketing, private trade was permitted subject to restrictive licensing requirements, but crop parastatals were rarely themselves privatised or dissolved, so they remained an overarching potential presence in the market, and their operational functions could be re-invoked at will by unilateral policy decisions by government decision makers. In input supply, subsidies often disappeared, then reappeared with unpredictable and variable participation by private sector fertilizer or seed suppliers in successive switches in the policy stance. The unpredictability of the continued erratic state presence in agricultural markets is itself held responsible for many of the market failures identified by the new institutional school discussed above. Traders face great uncertainty in their regulatory environment, inhibiting investment and discouraging normal entrepreneurial risk taking. As noted in Chapter 1, in some instances, changes in government regulatory stances have been observed to exacerbate rather than ameliorate market imbalances as they appear (Jayne *et al.*, 2006, p.328).

The conclusions deduced from these alternative interpretations on the failures of liberalisation are not, however, as far apart as the above dichotomy might suggest. There is wide agreement that consistency, predictability and transparency in the rules by which government behaves in input and output markets are prerequisites for private markets and services to experience declining risk and transaction costs, and improving coverage over time. The partial liberalisation school would go further in the direction of the responsibility of the state actively to support and facilitate private sector development, a position also held, albeit rather unevenly, in the *World Development Report 2008* on agriculture published in late 2007 (World Bank, 2007). The new institutional school would, on the other hand, err more in the direction of selective government action to overcome constraints hampering farmer uptake of inputs and improved technologies, as well as in order to address coordination problems between complementary services that the private sector seems to have particular difficulty in achieving.

For price instability, a range of different options are opened up by recent thinking. At one end of this range, there is the traditional use of buffer stocks, albeit with a lot more emphasis placed on the role of imports and exports than in the distant past. At the other, there is the deployment of private sector mechanisms to secure improved inter-temporal supply stability, utilising commodity exchanges and futures markets. In between there are various initiatives governments can take, with or without private sector participation, to improve information flows and the speed of price adjustments in domestic markets. The next section turns to these options for stabilisation, and elaborates them in more detail.

2.2 Current Policy Options for Price Stabilisation

While always representing a potential problem in food markets, especially for food deficit rural poor people, price stabilisation receives varying attention in the agricultural policy literature depending on particular ideas that are in the ascendancy at given moments in time. One way that high seasonal prices are brought back into the picture is in the context of severe food security stress in very poor countries like Malawi and Ethiopia that have become prone to recurrent food security crises in the past ten to fifteen years (Ethiopia, indeed, for even longer). A considerable proportion of the safety net literature (e.g. Grosh *et al.*, 2008) is to do with protecting vulnerable people from the adverse effects on their food consumption of adverse price swings, and this is true also of more recent interest in social protection policies (Ellis *et al.*, 2009).

As already mentioned in Chapter 1, in 2005 a workshop was organised at the World Bank on risk and price instability in food markets in which contributions by many of the leading authorities on marketing arrangements in low income countries were presented, with subsequent publication as a report (World Bank, 2005) and a set of journal articles in the journal *Food Policy* (amongst which Byerlee *et al.*, 2006 provides the editorial overview). In addition to reaffirming many of the perennial policy difficulties that surround successful price stabilisation, this workshop was able to bring to the surface a number of important factors that have changed over the past ten or fifteen years, that broaden the options for stabilization as compared to earlier periods. Some of these factors are as follows (see Byerlee *et al.*, 2006, Cummings *et al.*, 2006; Dana *et al.*, 2006; Jayne *et al.*, 2006; Poulton *et al.*, 2006b):

(a) private trade is more prevalent, and stronger and more capable, in the 2000s than was true in the 1970s or 1980s in virtually all economies, including in very poor African countries;

(b) globalisation has, in general, created relatively stable international food markets at low real prices in historical terms, and ability to import food has not been constrained by available global supply;[13]

(c) new devices for securing inter-temporal market stability have come into being, even in poor regions of the world, including commodity exchanges, futures markets, and specialised insurance contracts;

(d) mobile telephony has enormously increased the spread and speed of market information in most regions, with countrywide coverage being available even in quite poor countries, and access by the poor being possible due to the divisibility of the technology;[14]

(e) the same technology, allied to the falling real cost of computers and software, and the use of internet and email, mean that market information systems (MIS) for food crop prices can achieve more rapid and greater coverage, more cheaply, than was possible in past decades;

(f) in some regions, rising real incomes mean that consumers can afford more diverse diets than before, and price instability in any single component of their food consumption is less critical to their welfare than ten or twenty years ago (however, this applies less in very poor sub-Saharan African countries than it does elsewhere).

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[13] The price spike in 2007-08 was an exception to this statement, although prices for most commodities had returned to long run real levels by mid-2008. Some experts consider, however, that this crisis presaged more global food price instability and higher real prices in the future (Trostle, 2008 p.29; Banse *et al.*, 2008 p.30).

[14] Non-owners of phones can purchase time use in small amounts from owners.

These factors mean that governments can seek to ameliorate price instability in a number of different ways, rather than relying predominantly on fixed prices or buffer stock operations. Moreover, there remain almost no valid reasons why marketing boards or parastatal crop authorities should retain monopsony control over market supply, or operate buffer stocks within narrow margins that exclude private traders from intra-seasonal storage. Nevertheless, a mix of some modified traditional, and some new policy instruments, is likely to prevail in food insecure very poor sub-Saharan African countries for political as well as economic and social welfare reasons. Price instability has such severe repercussions for food deficit small farmers that failing to contain it within 'tolerable' limits is not an option either politically or in terms of protecting the food entitlement of the poor. Such a mixed approach is likely to comprise the following components:

Public Buffer Stocks

For the purposes of discussion here, a public buffer stock is any government operation that comprises purchases of a staple food from farmers or traders, its strategic storage for the purposes of release in the event of a market shortage, and the sale of stock at a trigger price or ceiling price to prevent upside price movements. Such a definition thus covers conventional buffer stocks of the kind that have been historically prevalent in Asia (Cummings *et al.*, 2006), as well as food security reserves or strategic grain reserves that have the additional important function of provisioning food deficit populations in the event of an emergency. The important character of a buffer stock is that it sets a floor (producer) price and ceiling (consumer) price, thus intending to keep domestic market prices within a range through purchases (at the floor) and sales (at the ceiling). Not all strategic reserves carry out the latter function, but they do tend to buy from producers and traders at a published producer price, thus putting a floor under the market. As discussed in the previous section buffer stocks have detractors as well as supporters, but they are certainly not written out of the acceptable array of policy options in a poor country in the early 21st century.

There are many variants on the basic buffer stock principle. For example, Agricultural Development and Marketing Corporation (ADMARC) in Malawi, since it stopped operating a pan-territorial producer price (see section 2.3 below), has at times had a price range for purchases from producers, and an entirely separate fixed consumer price (Chilowa, 1998). At other times, it has retained a producer price but decided not to defend the consumer price. In Asia, some buffer stocks have had 'trigger' prices in addition to floor and ceiling prices, recognising that there is a lag between purchase or sales actions and the impact of such actions in halting or slowing price trends. As previously discussed, it is widely agreed that buffer stocks should operate using a price band sufficiently wide for private traders to find the intra-seasonal storage of grain worth carrying out. The use of export parity pricing for the floor price has been suggested (Byerlee *et al.*, 2006). Buffer stocks are notorious for being politicised, and making variable pricing decisions depending on political pressures. For this reason, it is argued that they need to be recast as independent agencies or trusts, with a legal status that enables them to operate free of political interference (see discussion in Poulton *et al*., 2006b).

A further proposal is that they should be split between a physical stock operation, and a financial fund (Byerlee *et al.,* 2006). The purpose of the financial fund is to enable timely ordering of imports in the event of an emerging domestic market shortfall. This might be done directly by the agency itself, or by providing reliable credit lines to private importers. The financial fund, like the suggestion for the buffer stock more generally, should be managed independently of government and be in a convertible foreign currency like the US dollar. For coastal countries, the financial fund could be the chief instrument; while for landlocked countries like Malawi a mixture of physical and financial capabilities would be more appropriate.

More Flexible Use of Imports and Exports

The policy advice that low income countries should be more prepared to make use of imports to help keep their domestic food market in balance between demand and supply goes back to the very earliest advocacy of liberalisation (e.g. World Bank, 1981; Mellor and Ahmed, 1988). Using stocks to handle every possible range of fluctuation in the domestic food balance is exceedingly costly, and the volume of such stocks has to be a high proportion of domestic consumption (perhaps as much as 15 or 20 per cent) if the market is to be supplied always and reliably from domestic sources rather than from imports. At present in most African countries, grain imports and exports by private traders remain heavily controlled by the state, with each transaction requiring a license, and outright bans being unpredictably invoked.

As for buffer stocks, the policy advice in this area is for much greater predictability and transparency in government actions, allied to the removal of discretionary powers to alter at will the rules under which private traders carry out their activities (Byerlee *et al.*, 2006; Poulton *et al.*, 2006b). It is generally agreed that import and export licensing needs to be relaxed, and free cross-border movement of grains and other foodstuffs allowed to occur. This makes particular sense in southern Africa where, except when there is a regional drought, surpluses and deficits occur unevenly across the region, and free movement of supplies would help to even out the ensuing surpluses and deficits in different countries. For landlocked countries like Malawi or Zambia, political leaders have a genuine fear that imports will not be secured fast enough in the event of a crop deficit at home; however, the ability of the private sector to respond to such a situation remains largely untested since, almost without exception, one of the first things governments do when confronted by an emerging crisis is to hobble the ability of private trade to respond by banning private exports and imports.

Private Risk Management Options

The difficulties and paradoxes often encountered in government instruments to reduce instability in staple food markets leads in some sections of the literature to the advocacy of private instruments that can help smooth out undue fluctuations in markets, taking advantage of private incentive structures, inter-temporal mediation in formal exchanges like futures markets, and insurance contracts. The World Bank seems especially keen on expanding the use of such instruments (World Bank, 2005). Here we mention four instruments (or collections of instruments) that have received a lot of attention in the literature (Byerlee *et al.*, 2006; Dana *et al.*, 2006). These are commodity exchanges, warehouse receipt systems, futures markets, and weather insurance contracts.

Agricultural commodity exchanges (ACEs) are organised trading systems which bring together buyers and sellers of agricultural commodities, physically or through virtual trading platforms, using brokers who trade through price bidding as opposed to the individually agreed prices in a spot physical transaction (UNCTAD, 2005; Kutka, 2009). Three basic market functions are considered to be achieved by an ACE, and these are price discovery; price transparency through a bidding process that provides a mechanism for market clearing based on supply and demand; and lastly a reduction in transaction costs through the facilitation of contacts between buyers and sellers. This latter occurs because the exchange enables spatially separated buyers and sellers to be simultaneously brought into contact with each other, by comparison to the bilateral bargaining that occurs in individual spot sales.

It is thought that ACEs can reduce price instability since they facilitate more rapid spatial and inter-temporal adjustment of prices to changes in demand and supply, and therefore indicate to traders places and times when profitable purchases or sales can be made. Among the exchanges active in eastern and southern Africa are the Agriculture Commodity Exchange for Africa (ACE), based in Malawi, the Kenya Agriculture Commodity Exchange (KACE) in Kenya, the Malawi Agriculture Commodity Exchange (MACE),[15] and the South African Futures Exchange (SAFEX) in South Africa. Amongst these the only fully fledged futures market with international credentials is SAFEX. Other exchanges operate at varying lesser levels of sophistication involving spot and forward contracts; however, importantly allowing buyers and sellers in different places geographically within a country to trade with each other, therefore also helping to spread price information and achieve spatial arbitrage in which commodities move from surplus to deficit areas (Tollens, 2005).

The warehouse receipt concept is designed to enable smoother intra-seasonal storage by private traders, greater flexibility in the timing of sales, and collateral against which credit can be obtained (Coulter and Onumah, 2002). A trader or farmer deposits a stated quantity of grain in a warehouse, for which a receipt is issued, specifying the exact quality and amount delivered. The receipt is itself tradable (it can be sold to someone else), and can act as collateral against loans. It also allows for the decision to sell the commodity to be deferred by the owner of the receipt, since the receipt is only cancelled out when its owner orders the sale of that quantity out of store. An example of a pilot warehouse receipt system in Zambia is given a favourable write-up by the World Bank (2005, p.47). However, the use made of this facility began to dwindle after an initial promising start due to (i) an inability to pass required changes in the Agricultural Credit Act; (ii) heavy government intervention in the maize market, which reduced the supply of commercially traded grain that could be deposited in licensed warehouses; and (iii) a high degree of policy uncertainty in the maize market, reducing the ability of traders to take more than a one or two month view ahead of the market (Onumah *et.al.,* 2007; Tembo *et.al.,* 2009 p.19; Jayne *et al.*, 2009).

[15] The difference between MACE and ACE in Malawi, is that the target clientele of the former are smallholder farmers and buyers, while the latter is a purely private initiative serving large-scale buyers and sellers mainly for export markets.

A futures market permits forward purchase and sale of commodities to occur in future months, not just in a spot market physical exchange (see World Bank, 2005, pp.47-51). Users of futures markets make contracts to buy or to sell a commodity like maize for a given month in the future, and if they did nothing else until the date of contract fell due, then they would have to take physical possession of the commodity at the agreed buying price (or deliver the commodity at the agreed selling price) on that date. However, very few contracts in a futures market result in physical exchange in this way. This is because most futures traders take out an opposing contract that effectively closes out their position when the due date falls, so no physical trade takes place.

The way this works can be illustrated as follows. A trader believes that the maize price will rise steeply in six months time, say, from a current level of US$100 per ton. The trader takes a bet on this price movement, and takes out a futures contract now to buy 100 tons of maize in six months time at US$110 per ton. If the trader was correct and the price has risen, say, to US$150 per ton as the due date approaches, the trader will close out the contract by selling 100 tons of maize at the current price, thus realising a profit of US$40 per ton. Thus numerous traders take positions with respect to future price trends, and some of them make losses and some of them make gains from taking such positions, with the overall effect of causing a degree of inter-temporal price smoothing in the market (although such markets can also get into speculative cycles in which beliefs about future scarcity cause spiralling upward prices).

Futures markets can be combined with physical markets to offset risks in storage and future sale (or purchase) of the physical commodity. This is called hedging. To extend the previous example, if a trader has 100 tons of physical maize in store purchased at US$100 per ton, that trader's main worry is that the price of maize may fall or not rise enough over the next few months to compensate for the cost of purchase and storage. The trader can therefore take out a futures contract for sale of the same quantity of maize in three months time, say, at US$120 per ton. Then if the price in the physical (spot) market declines, say to US$80 per ton (resulting in a US$20 loss on the physical trade), the price in the futures market will also have declined, and the trader can close out the futures contract by buying maize at US$100 per ton (resulting in a gain of US$20 per ton in the futures market). This example evidently ignores commission and other charges on futures dealings.

Hedging is used widely by food processing industries worldwide to protect food manufacturers against unforeseen price changes in their raw material supplies. These hedges will normally be to counteract future unexpected rises in prices. In principle a government (or independent quasi-government agency) could do the same thing with respect to its projected likelihood of requiring imports in the future. In fact futures markets offer an additional device called a call (for purchases) or put (for sales) option that is more appropriate for the imports and exports respectively. A call option gives the buyer the right, but not the obligation, to buy the underlying asset (usually a futures contract) at a maximum strike price specified in the option contract; while a put option gives the seller the right, but not the obligation, to sell at a minimum agreed price. With support from DFID, Government of Malawi took out a call option for a specified quantity of maize in 2005 on the South African Futures Exchange (SAFEX), and was able to exercise this option successfully in order to offset a rise in physical import prices[16] that had occurred in the intervening period (Slater and Dana*,* 2006).

Nevertheless, futures markets, hedging and options represent considerable difficulties for their application in places where the more basic governance issues surrounding grain trading have yet to be resolved. In principle large traders in a country like Malawi could use hedging to stabilize operations not only in their own storage and sales operations, but also, by extension, to smaller traders and processors due to the greater price stability they would be able to secure through combining physical and financial trades. However, no maize trader in Malawi would enter into such contracts (especially if they involved imported supplies) given the high likelihood of sudden and unpredictable bans or restrictions by government. Meanwhile, governance issues would also pervade government direct operations in a futures market, since huge losses as well as gains could be incurred by positions taken in such a market.

Index-based weather insurance is a financial derivative instrument for reducing the risks of natural disasters, especially drought, by providing payouts against deviations from threshold rainfall or temperature indices. The levels of payouts made by insurance

[16] In September 2005, the Malawian government signed an options contract with Standard Bank of South Africa which allowed Government of Malawi to purchase a maximum of 60,000 tonnes of maize at a cost of approximately US$18 million. By October and November 2005 international maize prices had risen by US$50 to 90 which Government of Malawi avoided having to pay.

companies or banks offering the service are based on weather statistics, in particular rainfall data, compiled at specific weather stations. Deviations from threshold levels trigger automatic payouts without using conventional insurance methods based on actual calculated loss. The payout could then be used to purchase a call option (described above), to ensure that the country has timely access to maize at a guaranteed ceiling price. The weather derivative is believed to be superior to conventional insurance because payouts can be made quickly, as soon as the levels of the appropriate index (e.g. rainfall data) needed to trigger the payment are reached. However, two major limitations of index-based weather contracts are evident: differences between the amount of payout and the value of the actual loss experienced, and the fact that the weather index only covers 'deficit rainfall' risk and does not address other risks to agriculture such as pests, diseases, excessive rainfall at the wrong time of year, or floods. The system also needs substantial investment in weather station equipment and communication, and verified clean historical weather data. It requires a high level of trust between a government and the private sectors suppliers of the service, and rigorous testing of the trigger thresholds. Successful examples of private markets for rainfall insurance can be found in India (Byerlee *et al.*, 2006).

Index based weather insurance potentially acts positively on price instability by providing the financial means (through the rapid payout) either to purchase physical imports immediately, or (as suggested above) to use futures markets to offset risks regarding the future price of physical imports. The timely arrival of imports, even in a landlocked country, would then have the effect of counteracting upward price pressures in a deficit market. However, reluctance to take early action on imports is an observed feature of government decision making in countries like Malawi, so perhaps the reasons for such reluctance need to be addressed first, before entering into more sophisticated instruments for smoothing out the cost of the imports.

The plausibility of all these private risk management alternatives is crucially dependent on rule- rather than discretion-based decision making by governments, for otherwise the required level of trust in the future security of contracts entered into today is fatally compromised. Interestingly, the World Bank (2005, pp.53-54) which sets out a powerful advocacy for the greater use of such instruments, nevertheless rules them out for circumstances where the necessary predictability and adherence to contract and rule of law by government is lacking.

Market Information Systems

Market information systems (MIS) are discussed separately here because they can be run by the government or by private information suppliers. If the latter then they would belong in the group of private risk management instruments discussed in the preceding section. The objective of MIS is to improve the speed and reliability of price information available to all market participants i.e. farmers, traders, storage agencies, food processors, institutional buyers and so on. Timely and accurate price information can help farmers obtain better prices from traders, can help traders identify buying or selling opportunities, and can help the spatial functioning of markets by allowing participants to observe market conditions in different parts of the country (Mukhebi and Kundu, 2003; Shepherd, 1997). In this way, like commodity exchanges, MIS should stimulate more rapid spatial arbitrage, in which crops are moved from surplus areas with lower prices to deficit areas with higher prices. For all these reasons, MIS can also help to avoid excessive price instability occurring in particular locations where local markets are in short or excess supply, although by itself it is unlikely to reduce generalised price instability occurring due to shortages or surpluses occurring on a national scale.

To some degree, low income countries have long had MIS of a kind. There is often a price unit in the Ministry of Agriculture that collects prices from markets and diffuses this price information to other government agencies as well as to the media which may publish or broadcast them on a routine basis. Such information has long been used by food security agencies within government such as crop early warning systems. The speed of transmission of this information is greatly improved by newer technologies. Prices can be phoned in from market collection points, entered on computer, and sent out by email to a network of institutions.

A more fully-fledged MIS takes this basic idea and extends it in coverage and speed. It adds more markets from which price data is retrieved, and has agents at markets that transmit the current price hourly rather than just once or twice a day. Using mobile telephony, prices are texted to a central data processing unit, thus avoiding errors of transfer from one communications medium to another. The central data unit then automatically texts data outwards to the mobile phones of subscribers to the MIS service; hence a trader in one part of the country can be made hourly aware of prices at selected markets all over the country. Such a system is also likely to provide regular price updates by radio at set times of the day, every day of the week, and may also negotiate a daily slot on television. Price data submitted by text are easily converted into database or spreadsheet tables, which can then be emailed out to government, NGO and private institutions.

Malawi has had a publicly funded MIS that does all these things since 2004. The service is jointly provided by MoAFS and MACE. The latter collects wholesales prices from 13 markets for over 40 commodities, using market information points called Market Resource Centres (MRCs) across Malawi's three regions. Some of the MRCs are run directly by MACE and some are franchised to private operators. In addition to collecting price information, MRCs also facilitate trade transactions in the form of offers to sell and bids to buy agricultural produce. In parallel, MoAFs collects farm gate and retail prices from 80 markets (the methods for doing this are detailed in Chapter 3 below). Retail prices from both sources are disseminated by MACE using mobile phone SMS, email, radio and (to a limited extent) internet (IDEAA Malawi, 2005).

Social Safety Nets

It is possible that permitting price instability within a range that properly allows for the competitive intra-seasonal storage of grain by the private sector, may nevertheless, create undue hardship for the proportion of the population whose livelihoods are so precarious that quite moderate seasonal price rises place purchase beyond their reach, and they begin to compromise family nutrition, and face real hunger. This can occur to farm families that only ever manage to produce less than 6-8 months of their annual food requirement, and for whom available employment opportunities are very limited.

One approach to dealing with this problem without squeezing the margin between the buying and selling prices of the government food security agency, so that it incurs losses and private traders are excluded, is to treat extreme vulnerability as a separate policy problem, better treated by social protection instruments than by price policy instruments. This approach receives considerable support from the World Bank (Grosh *et al.*, 2008). The main form in which it appears in poor countries with major problems of vulnerability to hunger is in food-for-work or cash-for-work schemes, often also referred to as public works programmes (PWPs). Food-for-work and cash-for-work schemes are self-targeted forms of social protection. They rely on providing food or cash in return for work, at a value that is below the ruling market wage, so that only those who have no other option for avoiding hunger are likely to turn up to do the work.

In the case of food-for-work, the food that is provided is typically food aid supplied by the World Food Programme or channelled through NGOs; while cash-for-work is normally funded by donors in low income African countries. It is worth noting that food and cash have different market effects. Food delivery has a moderating effect on food prices, and is therefore appropriate if absolute shortage of supply is the key cause of an upward spike in prices; whereas cash increases people's purchasing power over food, and would tend to support the price of food rather than bring downward pressure to bear on it. These effects are only likely to be significant for large PWP programmes, such as the Productive Safety Nets Programme in Ethiopia (Ellis *et al.*, 2009; pp.30-32). Despite their popularity in the 1990s and early 2000s, PWPs have a number of well-known flaws (Ellis, 2007 p.6; McCord, 2008):

(i) by definition, their recipients must be capable of hard physical work, which means that they are unable to target the old, the ill, the disabled, or women looking after orphans and vulnerable children – categories that are considered by many to be the most significant vulnerable groups;

(ii) there is a risk that their occurrence in the hungry season, which is also the cultivation season for the next year's crop, diverts labour away from the best cultivation practices;

(iii) PWP projects are costly to set up and execute, since skilled personnel are needed to design and manage them if they are going to produce useful infrastructure;

(iv) they are costly for other reasons too: maintaining a national capacity to respond to scattered and unpredictable geographical food deficit failures is very expensive, and gearing up and winding down seasonally intermittent projects is also costly;

(v) for vulnerable people facing inadequate access to food for a few months in the hungry season timing is crucial, yet PWPs are prone to logistical delays meaning that they sometimes miss the critical months;

(vi) when dependent on local power brokers to select beneficiaries (which often occurs when self-targeting is rationed), inclusion and exclusion errors are rife; however, the more accurate method of community targeting is skill- and time-intensive in its own right;

For these and other reasons, current thinking has moved away from food- or cash-for-work towards more continuous forms of cash transfer to vulnerable people. Such cash transfers can be targeted in a deliberate way towards the poorest and most vulnerable people in a country (so-called ‘poverty targeting’), or can take the form of categorical transfers such as a social pension that is universally provided to all people that fit the category (in the case of a pension, the single criterion is an age threshold such as 65) (Ellis *et al.*, 2009).

2.3 A History of Maize Market Regulation in Malawi

In Malawi, maize production has always been fundamentally a smallholder crop, in contrast with neighbours Zambia and Zimbabwe in which large-scale commercial maize production was historically an important feature of their food production structures. Policy towards the maize sector since independence in 1964 has often represented tensions between food security and export promotion objectives, mediated by farm size and tenure considerations. For at least two decades after independence, the government of Dr Hastings Kamuzu Banda pursued a policy of land alienation from the customary sector, allied to the growth of export production (especially tobacco) on larger holdings. The outcome of this process was the emergence of a dual agricultural economy characterised by shrinking customary land on which most food was grown by small farmers, and an expanding export crop estate sector, with the customary sector nevertheless expected to play the predominant role in national food self-sufficiency (Kydd and Christiansen, 1982; Harrigan, 2001).

From independence until 1987, the markets for maize and other outputs from the customary small farm sector were heavily regulated. Initially this regulation was implemented through a marketing board called the Farmers Marketing Board, the latter being converted with extended powers and responsibilities into the Agricultural Development and Marketing Corporation (ADMARC) in 1971. ADMARC and its predecessor organisation implemented pan-territorial and pan-seasonal fixed prices to smallholder producers, a fixed public sale price to food consumers, and the delivery of subsidised fertilizers to farmers (Chilowa, 1998). Both producer and consumer prices were announced before the beginning of the growing season. While some localised private trading may have occurred on the small scale in the 1960s, ADMARC was conferred monopoly powers over the purchase of marketed food and other crops, with the result that private trade in scheduled commodities from the early 1970s onwards was effectively prohibited, and would have only continued to occur in small quantities in localised informal markets.

During the 1970s, a systematic extraction of a financial surplus from the small farm sector via price policy and its transfer to the estate sector occurred (Kydd and Christiansen, 1982). Maize, however, was not drawn into this process, due to the critical role of the smallholder sector in ensuring national food self-sufficiency and the importance of low cost food availability for the growing workforce on estates specialising in export production. Maize, if anything, was subsidised rather than used for surplus extraction, with ADMARC trading losses in maize purchases and sales recorded in most years (Kydd and Christiansen, 1982, p.367). Rather, the financial surplus was created by paying small farmers low prices for export crops (fire-cured tobacco, cotton and groundnuts) and selling these crops at high export prices. Surpluses thus generated were transferred to the estate sector through cross-ownership holdings between ADMARC and Press Holdings, a national conglomerate owned by the President but operated as a private holding company with equity investments in almost all sectors of the economy (Harrigan, 2001, pp.35).

Available evidence suggests that domestic maize output more or less kept pace with rising population and demand through the 1960s and 1970s. Of course, only a small fraction of total maize output was sold, and most maize was grown for subsistence. The growth of subsistence production (predominantly maize) used in Malawi's national accounts in this period seems to have been substantially exaggerated, therefore also resulting in overestimates of agricultural and economic growth (Kydd and Christiansen, 1982; Pryor, 1990; Harrigan, 2001, pp.18-22). In this period, too, there was discrimination in policy between ordinary customary smallholders, and larger food crop farmers known as *achikumbe* (progressive farmers) who were able routinely to deliver a food surplus to ADMARC, and who were favoured in the delivery of inputs and extension services (Harrigan, 2001, pp.57-8).

It has already been noted that for a landlocked country like Malawi, remote from international markets, the gap between import parity and export parity prices for maize is so large that parity pricing principles offer little guide to the appropriate level of domestic prices. Indeed, Harrigan (1988, p.417, *fn*1) cites a calculation made by the World Bank for the single year 1977 in which the farm-gate export parity maize price was 1.4 tambala per lb, while the farm-gate import parity maize price was 7.9 tambala per lb.[17] Farm-gate maize prices set by ADMARC during the 1970s were significantly above export parity, reaching 6.6 tambala per lb in the 1979/80 crop season. Nevertheless, most calculations suggest that the income terms of trade of food crop farmers barely held its own during the 1970s due to no discernable growth in yields and rapid inflation towards the end of the decade eroding the real value of ADMARC purchase prices.

Towards the end of the 1970s, the Malawi economy ran into serious crisis, characterised by rising import prices (especially the 1979 price spike in oil and petroleum products), declining export prices, and rising losses in estate and other commercial companies owned by the government, or in which the government had a significant stake. The IMF and the World Bank arrived at the door, and several IMF Standby Facilities were negotiated, as well as three successive World Bank Structural Adjustment Loans (known as SAL I, II and III). According to Harrigan (1988; 2001) the World Bank seriously misunderstood the peculiar set of pillars upon which the Malawi agricultural sector rested, resulting in an over-optimistic view about output and yield trends in maize production, as well as about small farmers' ability to respond to improving price signals for export crops. The Bank initially heavily pressured for smallholder export crop prices to be pushed to export parity (SAL I in 1981) and recommended that the maize price not be raised in real terms. The Government of Malawi reluctantly acceded to raising export crop prices, but disobeyed the Bank with respect to the maize price, which it nearly doubled in nominal terms to 11.1 tambala per lb for the 1981/82 crop season.

During the 1980s, at least up to 1987, ADMARC continued to implement maize price policy much as it had done in the past, albeit with increasing difficulty in remaining commercially viable as a marketing corporation in the process (Christiansen and

[17] The tambala is a unit of Malawi currency which gradually became valueless with inflation during the past 30 years. There are notionally 100 tambala to 1 Malawi Kwacha (MK). The recent official exchange rate in the 2000s has been 140MK to the US$, so that 1MK is worth 0.7 US cents, and one tambala would be worth 0.007 US cents.

Stackhouse, 1989). The maize producer price continued to be pan-territorial and announced in advance of the crop season, and was kept towards the top of the import-export parity price range. Consumer prices of maize were held down, however, so that ADMARC incurred accumulating losses in its maize trading activities. The rise of smallholder export crop prices towards export parity also squeezed the corporation's margins for those crops, thus removing its ability to remain profitable in crop sales. In addition, its functions in input supply and delivery of other services to farmers were insufficiently funded by government, adding to its burgeoning losses. In addition, in 1981, ADMARC had been assigned the new task of running the country's Strategic Grain Reserve, meaning additional costs incurred in the longer-term bulk storage of maize for national food security purposes. In effect, a crisis was precipitated in ADMARC by the policy shifts of the period 1981 to 1985, and by the 1985/86 crop season the corporation was incurring huge losses (Christiansen and Stackhouse, 1989; Chilowa, 1998).

The first two SALs did not insist on liberalisation of crop markets; however, the second one strongly advocated the payment to smallholders of export parity prices for those export crops that they were permitted to grow. The second one also advocated the gradual elimination of the fertilizer subsidy, and a fertilizer subsidy removal programme was created to put this into effect. The third SAL, which occurred in two stages in 1986 and 1987 became much more forceful with respect to liberalisation, essentially requesting the government to divest ADMARC of its functions that were unrelated to crop marketing, and to open up all crop markets to competition from private traders. Specifically, SAL III Supp, demanded that agricultural markets were deregulated and (Christiansen and Stackhouse, 1989) that:

(a) government announce that private individuals could participate in crop trading;
(b) all markets in which ADMARC purchased less than 60 tons per annum be closed;
(c) ADMARC institute differential crop prices between its regional depots and the traditional seasonal buying points;
(d) ADMARC eliminate the losses on the maize account by the end of fiscal 1988 by instituting differential prices, cutting consumer subsidies and improving efficiency;
(e) government agree to a liberalisation scheme for ADMARC.

Due to the parlous state of ADMARC's finances by then, the Government of Malawi was in a weak position to resist these conditions, even though there was considerable scepticism regarding their effect on farmers at the Ministry of Agriculture (Smith, 1995). In many ways, 1987 was rather a decisive year for agricultural policy in Malawi. The government with unusual haste passed the Agriculture (General Purposes) Act and the Agricultural Produce (Marketing) Regulation Act (Chilowa, 1998, Øygard *et al.*, 2003) which between them terminated ADMARC's monopsony purchasing power over smallholder crops, and opened up markets to private traders. Nevertheless quite severe restrictions were at that stage imposed on private trade (Chilowa, 1998; Smith, 1995):

(a) private traders were to be licensed annually to operate in specific markets;
(b) only Malawian nationals or businesses owned by Malawian citizens were to be eligible for licenses;
(c) minimum producer prices were announced annually and ADMARC would buy at these prices;
(d) maize exports were controlled through the export licensing system; and
(e) traders were to submit monthly reports detailing prices paid and received, and amounts bought and sold.

The requirements for private licensed traders were extremely restrictive in specifying limited times and places for trading. Traders had to pay cash, observe minimum-price regulations and use approved and assized weights and measures, and submit a monthly return of all transactions to the local Agricultural Development Division (ADD) office. The licensing procedure was decentralised to ADDs, with each ADD being responsible for licensing traders operating in their area after ensuring that they had proper weighing scales. Despite the restrictions, there was initial enthusiasm from the private sector with 817 traders obtaining licenses countrywide in 1988/89, though this then fell to 543 traders in 1989/90. In the event, diminishing numbers of traders complied with the less enforceable restrictions imposed upon them, especially those related to reporting times, places and weighing scales. These limitations were later revoked, but not until 1992 (Smith, 1995). ADMARC remained the dominant single buyer in the market in this period until the end of the 1980s (Chilowa, 1998).

The events of 1987 and succeeding crop seasons altered the balance of institutional controls over prices and markets for small-farm crops in Malawi (Smith, 1995; Chilowa, 1998; Harrigan, 2001; 2003; Oygard *et al.*, 2003, Chirwa, 2006). ADMARC closed a number of its seasonal depots, and implemented a dual pricing policy whereby a minimum price was paid to farmers at sites of seasonal purchases, and a higher price was paid for bulk purchases from traders at regional depots. The intention was to offload some of the operating costs of marketing onto the private sector, while still enabling ADMARC to play the buyer-of-last-resort role in markets. The government took over ownership of the Strategic Grain Reserve (thus removing the financial responsibility for it from ADMARC) but left ADMARC in charge of purchase, storage and sale operations from the stock. In 1990, the former Special Crops Act was amended to allow burley tobacco to be grown by small farmers for the first time. In 1994, the Agricultural Produce (Marketing) Act revoked the ban on private exports of crops, with the exception of maize which remained controlled by the Control of Goods Act, requiring export licenses for maize. In 1995, there was a broad liberalisation of all crop prices, meaning that traders could buy and sell them according to market conditions, except maize. A maize price band was introduced for the producer purchase price by ADMARC while its sale price of maize remained pan-territorial and pan-seasonal. ADMARC was entrusted with defending the band, but it was free to set its maize producer price anywhere within the band across markets and seasons.

The scale of changes in ADMARC's position can be seen by comparing its outreach in the late 1980s with that in the early 2000s. In the late 1980s, ADMARC had 3 regional offices, 12 divisional offices, 80 area offices, 217 unit (primary) markets, and 1,300 seasonal markets across the country (Chirwa, 2006). By 2001, the corporation had 14 district headquarter offices (replacing the division and area offices), 10 depots, 343 unit markets (permanent structures able to operate through the year), and 441 seasonal markets. In 2002, two of its three regional offices, for Central and Northern Regions, were combined (Chirwa *et al.*, 2005). ADMARC remains a large player in crop marketing in Malawi, a position strengthened in recent years by its responsibility in distributing subsidised fertilizers (see below), but its share of crop purchases from farmers is substantially diminished compared to the 1980s.

In the 2000s, different challenges have arisen for the proper role of ADMARC in the maize market, and in regard to price stabilisation. As shown in Figure 1.1 and Table 1.2 in Chapter 1, the 2000s have experienced quite extreme volatility in production outcomes and price instability in different parts of the decade. There have been seasons when ADMARC has set out to defend a producer price range, then abandoned the attempt when market prices soared out of the range. In other seasons, ADMARC has itself joined the scramble for supplies, lifting its buying prices in line with market developments. For a period in 2008, ADMARC was temporarily given monopoly control again over maize trade, in an effort to control spiralling prices in a year with an apparently good harvest according to official production figures. These positions and events in the 2000s are explored in greater depth in Chapter 6 of this thesis, as part of an effort to understand the politics and public decision making that has made coordination between the public and private sectors in the maize market so difficult to achieve for market stability in recent times.

No account of government regulatory behaviour in the maize market in Malawi would be complete without reference to fertilizer subsidies. This thesis has a focus on the output market and price instability for maize; nevertheless fertilizer policy is an integral part of overall agricultural policy, and has been a contentious and politicised part of Malawi government policy for many decades. Moreover, fertilizer prices and maize output prices are inextricably linked at the level of farmer decision making. Past history shows that if the ratio of fertilizer price to output price becomes unfavourable in farmers' own calculations of the costs and benefits of using fertilizer, then demand for fertilizer declines steeply, and so, too, do crop yields. With the recent steep rise in the cultivation of composite and hybrid maize varieties (detailed in Chapter 1 above), this price relationship becomes more critical since such varieties need fertilizer in order to realise their yield potential above that of traditional maize varieties.

From the 1960s to the 1980s, fertilizers were publicly supplied to the small farm sector at subsidised prices, and from 1971 ADMARC was the sole importer and distributor of fertilizers to the sector (Smith, 1995). In the 1970s, this subsidised distribution could be regarded as quite successful since ADMARC coordinated credit for purchase, supply, and crop purchase, ensuring a high level of recoupment of input loans (Dorward and Kydd, 2004). Nevertheless, by 1982, subsidies were costing 6 per cent of the government budget, and World Bank began to exert pressure for a phased removal of the subsidy (Chirwa, 2006). In 1983, the Smallholder Fertilizer Revolving Fund (SFRF) was created to take over the procurement of fertilizer from ADMARC, but the latter remained responsible for distribution to smallholder farmers.[18] SFRF later became the Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM) an agency that continues to play an important role in fertilizer importation and distribution to warehouses to this day.

In 1987, the Malawi government unilaterally withdrew from the phased fertilizer subsidy removal programme, instead opting to increase the subsidy to 22 per cent, which was a little higher than it had been in the immediately pre-reform period (Harrigan, 2003). The increasingly adverse fertilizer: maize price ratio is cited by observers as the principle reason for this decision, allied to fears regarding production and food security outcomes of continued removal (Chilowa, 1998). The next year, a fertilizer buffer stock project was funded by the EC, resulting in the construction of four fertilizer stores for SFFRFM with a total capacity of 140,000 tons (Smith, 1995). This coincided with serious disruptions to Malawi's supply lines due to civil war in Mozambique.

In 1990, the government signed an Agricultural Sector Adjustment Credit (ASAC) with the World Bank, which effectively restarted the process of removing fertilizer subsidies that had fizzled out in 1987. Additional aims were to open up fertilizer distribution to the private sector, and improve SFFRFM financial management (Smith 1995). The government agreed to this liberalization subject to ADMARC retaining a role as 'seller of last resort' at a ceiling retail price for fertilizer. Thus for the first time in post-independence Malawi history, fertilizer subsidies were removed in 1991 (Chirwa, 2006). However, in 1991/92 there was a regional drought that reduced Malawi maize output by two thirds (see Table 1.1 above), and the immediate policy response was for the institution of a Drought Recovery Inputs Programme (DRIP) for the 1992/93 crop season (Harrigan, 2008). In 1993/94, fertilizer subsidies were once again dropped, with the consequence that fertilizer prices roughly doubled due to a simultaneous large devaluation of the Kwacha.

For the 1994/95 crop season, politics entered the picture in the form of the first multi-party elections in 1994, and a promise by the UDF party leadership (who won the election) to forgive outstanding credit for input purchases and to reinstate lower

[18] This split in functions occurred due to questions over the financial integrity of fertilizer procurement by ADMARC (Oygard *et al.*, 2003).

fertilizer prices. A Supplementary Inputs Project (SIP) was established with funding from UK ODA (soon to become DFID), targeted at 800,000 smallholder families, predominantly in southern Malawi. This was a fairly limited scheme, unlikely to make a great difference to maize output overall. It was succeeded by three seasons of complete subsidy removal from 1995/96 to 1997/98; however, the government was increasingly at odds with the World Bank about this policy stance, and acquired allies in the donor community and amongst the large NGOs that were particularly concerned with household level food security. In 1996, the Fertilizer, Farm, Feed and Seed Remedies Act was passed, removing many of the petty and unenforceable restrictions that had previously hampered private trade in fertilizer and other farm inputs (Øygard *et al.,* 2003).

For the 1998/99 crop season, with an election coming up in 1999, a major reversal in fertilizer policy occurred with the introduction by the government of the Starter Pack scheme at a cost of US$23.5 million, with an outreach of 2.3 million smallholders, funded by DFID. This involved supplying farmers with small packs containing semi-flint hybrid maize seed (2 kg), fertilizer (15 kg) and legume seeds (1 kg) to improve soil fertility. These packs were enough to cultivate 0.1 ha (Harrigan, 2003; 2008). The Starter Pack ran for a second year in 1999/2000 as a universal scheme open to all small farmers and with an estimated uptake of 2.8 million farmers. Yields and output jumped by about 40 per cent over the preceding levels; assisted by good rainfall amounts and patterns in those two seasons.

Nevertheless, an apparently quiescent World Bank up to that point suddenly reverted to a harder stance, and put considerable pressure on other donors (principally DFID) to move away from universal coverage. The consequence was the replacement of Starter Pack by the Targeted Input Programme (TIP) for the 2000/01 crop year, still funded predominantly by DFID. TIP provided 1.5 million beneficiaries with 5kg fertilizer, 2 kg of open-pollinated (OPV) or hybrid maize seed and 1 kg legumes (soya, beans or groundnut seeds). The following year, TIP coverage was reduced to 1 million beneficiaries, but the size of pack was increased to 10 kg of fertilizer, and in 2003/04 coverage was reduced still further to cover 400,000 beneficiaries with 5 kgs fertilizer, 2 kg of OPV seed and 1 kg legume seed.[19] In 2004/05, TIP coverage was planned to be

[19] This was mainly a winter targeted programme, for maize grown out of the main cultivation and harvesting season.

reduced still further; however, at the last minute a near universal scheme was implemented largely with government funding to reach 2 million small farmers. The reasons for this were political and associated with elections in 2004 in which promises were made to re-introduce universal fertilizer subsidies. Looked at retrospectively, output in the period 2000-05 does not unambiguously demonstrate the value of TIP, with an average production figure of 1.5 million tons, dipping to 1.2 million tons in 2004-05. On the other hand, there is always the counterfactual argument that production may have been even lower without this intervention.

For the 2005-06 crop season, and subsequently, the government made good on its 2004 election promise of re-introducing a more comprehensive fertilizer subsidy. The Agricultural Input Subsidy Programme (AISP) has provided 1.7 million (and upwards) farm households with subsidised fertilizers via a coupon distribution that provides beneficiaries with two 50 kg bags of fertilizer at greatly discounted prices. The details of the AISP are set out in Dorward *et al.* (2008) and Dorward and Chirwa (2009).[20] Here some summary details of its functioning up to 2008/09 are provided in Table 2.1. Due to rising world prices of fertilizer, the subsidy rate grew steeply from an initial level of 64 per cent to an estimated 92 per cent 2008/09. This also increased the share of the subsidy in government revenue from 5 per cent to 14 per cent. The 2008/09 figures reflected a price spike that occurred in world fertilizer prices in mid-2008. Nevertheless, this is an historically unprecedented level of fertilizer and other input subsidisation for Malawi. The subsidy is associated with (but not necessarily entirely responsible for) an apparent increase in production from an average 1.55 million tons 2000-05 (5 years) to 3.03 million tons in 2005-09 (4 years). Production outcomes in this latter period are explored further, in a different context, in Chapter 6 of this thesis.

This rather condensed history of maize market regulation and fertilizer subsidy policy in Malawi provides an essential background to the analysis of price instability in the maize market over the past twenty years, as well as to the functioning of the private maize market and the public-private interface in regulatory decision making that are the key themes of this thesis. Some key summary points that emerge are as follows:

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[20] The AISP has become Government of Malawi's flagship economic policy, but remains controversial on numerous grounds including its funding (ostensibly funded by the government, but nevertheless dependent on general budget support), targeting (who actually gets the coupons), secondary markets (in coupons and fertilizer), impact on food security at the household level, and accuracy of the maize output levels attributed to it.

Table 2.1: Basic Data on the Malawi Agricultural Input Subsidy Programme 2005-09

Fiscal Year	Households Reached	Subsidised Fertilizer Sales	Coupon Redemption Price	Coupon Market Value	Approx Subsidy Rate	Est. Budget Cost	Budget Cost
	no.	**tons**	**MK/50kg**	**MK/50kg**	**%**	**MK m**	**US$m**
2005-06	1,370,060	131,388	985[a]	2735	64	6,937	58.6
2006-07	1,772,280	174,688	950	3430	72	9,067	64.8
2007-08	1,700,000[b]	216,553	900	4199	79	15,018	107.3
2008-09	1,700,000[b]	170,000[b]	800	9800	92	29,411[c]	210.1

a in 2005-06 subsidised maize fertilizer was sold at MK950 and tobacco at MK1450 per 50kg bag, this figure represents a weighted average
b planned figures for outreach
c 2008-09 is an IMF estimate from January 2009 report

Source: Ellis (2009) drawing on Dorward and Chirwa (2009) and IMF (2008; 2009)

(a) since the late 1980s, policy has been highly unstable, both for maize markets and for farm inputs;

(b) this instability has reflected considerable tension between external pressures for policy change from international financial institutions and internal resistance to change by successive Malawi governments;

(c) policy switches that have occurred have reflected the often brief ascendancy of one side or the other in terms of leverage over the course of events, with more liberalisation and less subsidies occurring when the external agencies have been in the ascendant, and reversion to more regulation and more subsidies when the Malawi government has felt able to exercise more control;

(d) this unstable policy progression has been exacerbated by changes of opinion and priority by the World Bank at different points of time, as well as tensions between the World Bank and other donors (Harrigan, 2003);

(e) the Malawi government has had a continuous priority of securing maize self-sufficiency at national level, and at times this has coincided with the evolving concerns of donors regarding household level food security, thus resulting in some periods of agreement over objectives and the means to secure them;

(f) maize policy in Malawi is understandably highly political, and many decisions can only be understood in terms of electoral cycles, promises made by political parties and their leaders prior to gaining power, and the goal of securing political support from important sectors of the populace in the future;

(g) policy instability and political expediency are not good ingredients for reducing price instability in the Malawi maize market, and the way this has worked out over time becomes apparent in the course of the analysis undertaken in this thesis.

2.4 Politics

The preceding two points open up the important consideration of the politics of maize markets in countries like Malawi, and the intention here is to provide a brief overview of political strands that appear in the literature. Almost all contemporary observers emphasise the highly politicised character of maize policy decision making in eastern and southern African countries (Gray, 1992; Jayne *et al.*, 2002; 2006; Poulton *et al.*, 2006b). The politics of marketing boards has a long history, recognising that for food crops they enable control to be exercised over producer prices and consumer prices separately; and for export crops they have often in the past represented one of the chief sources of government revenue for recurrent and development expenditure (Bates, 1981a; 1981b). It is inevitable that politics should permeate a dimension of national life as sensitive as the price of a country's staple food. At the farm-gate level this price can make farmers happy or annoyed, can affect the electoral prospects of politicians from rural constituencies, and directly affects the incentive to produce for the market. At the consumer level, it affects the well-being of consumers and, indirectly, pressure on urban wages since a high food price has knock on effects on minimum acceptable wage levels in urban areas. Even in autocratic and undemocratic states, political leaders must have regard to these price levels, as social unrest or even *coups d'etat* can happen if entire segments of the population consider their lives to be undermined by the level of food prices they confront.

The politics of food prices often plays itself out in terms of claim and counter-claim between government and opposition parties or groups. One party will claim to have raising producer prices as a goal, then others must make similar claims to retain credibility, and the same happens (although in opposing ways) with consumer prices.

When a crisis occurs, politics takes the form of diverting blame from government action (or inaction) to other causes such as events beyond the government's control (drought, world prices), or the unethical profiteering of the private sector. Private traders throughout history, and frequently, are made the scapegoats for food shortages and steeply rising prices (Ellis, 1992; p.101).

However, the politics of food and food prices can go beyond partisan posturing about price levels and the reasons for adverse trends or events. Many countries in sub-Saharan Africa are considered to have so-called neo-patrimonial approaches to government and governance, characterised by excessive patronage, allegiance, cronyism, and rent seeking (Jackson and Rosberg, 1984; Sandbrook, 1986; van der Walle, 2001; Cliffe, 2006; Kydd, 2009). Under neo-patrimonialism, politics is the art of private wealth generation for 'insiders', reward for support and allegiance, and neglect of transparency and rule of law. The food marketing system represents opportunities for private wealth creation through public office, via margins between buying and selling prices, subventions for particular operations, control over food security stocks, licensing of private traders, control over imported supplies, distribution of subsidised inputs and other devices.

Malawi is regarded by some observers as an almost archetypal neo-patrimonial state, with patrimonial modes of governance deeply embedded since early in the long dominance of Dr Hastings Kumuzu Banda over the country ("president for life" from 1964 to 1994) (Cross and Kutengule, 2001; Booth *et al.*, 2006). It has been argued that the food crisis of 2001/02 in Malawi and other southern African countries stemmed partly from the neo-patrimonial character of their politics. In Malawi, this applied especially to the management of the Srategic Grain Reserve as the crisis gathered momentum (Cromwell and Chintedza, 2005; Booth *et al.*, 2006; Takaravash, 2006; see also Chapter 6 below).

In view of these considerations, there are at least three political dimensions that are likely to be present with varying force in food policy decision making in Malawi. First, there is the politics of keeping one step ahead of opposition politicians and groups, and this may result in decisions that are reactive to claims put forward in the country's media, rather than based on a careful consideration of the relation between cause and effect (Booth *et al.*, 2006). Second, there is the politics of shifting responsibility when things go wrong, and this can again mean that attention is diverted from seeking to understand and address the true causes of the problem that has arisen. In some instances, pinning the problem on scapegoats is replaced by the even simpler (although riskier) political option of denying that an emerging problem exists.[21] Third, there is the politics of keeping open the potential for patronage and reward within the staple grain trading sector, and this is likely to be connected to the funding of ADMARC to undertake designated functions, as well as the licensing regime for private traders in force at any particular moment in time.

[21] This seems to have been the strategy adopted by President Muluzi in Malawi in 2002 when confronted by mounting evidence of serious famine taking hold in some parts of the country (Devereux, 2002)

Chapter 3 : Empirical Methods and Fieldwork in Malawi

3.1 Introduction

The purpose of this chapter is to set out the methodological aspects of the research conducted for the thesis. This mainly comprises establishing the analytical and field methods related to the time series analysis of price instability and the cross section examination of market structure and conduct. However, other methods also have a bearing on the data used for different purposes in the thesis. Specifically, the methods used by Malawi government agencies to collect data on maize prices and production are important for the confidence that can be attached to underlying data accuracy, and therefore also for confidence in the findings that are obtained by analysing such data, or by using it to infer certain arguments about the effectiveness of policies. Therefore, this chapter also provides a description of these methods.

This thesis is mainly concerned with 'price analysis' and is therefore firmly located in an established repertoire of descriptive statistical methods for describing price behaviour in agricultural markets (e.g. Goetz and Weber, 1986). Issues of deep epistemological complexity do not really arise here, and it will be apparent that the thesis travels light on post-structural or postmodern strands of thought concerning the relationships of knowledge to power and to personal subjectiveness (Tavares, 1998; Long *et al.,*1999). However, it is acknowledged that these latter concerns can be important in relation to the conduct of fieldwork, and due account of them is taken of them in that context.

The fieldwork component of the thesis involved both qualitative and quantitative data collection and analysis. It has become widely understood over the past two decades that qualitative and quantitative investigations are complementary to each other, rather than substitutes or reflections of a differential scientific legitimacy, as often previously considered. In particular, quantitative methods are good at dealing with measurable entities, but are not always strong at social and cultural factors that may defy measurement but at the same time have a useful bearing on the interpretation of quantitative results (Kanbur, 2001; White, 2002). A thesis like this either implicitly or explicitly conforms to a methodological stance that is referred to in the literature as 'analytic narrative' (Levi, 2004). In analytic narrative, a continuous interplay occurs between 'known facts' (observable or retrievable data and its analysis) and interpretation of those facts according to the multiple perspectives from which they can be viewed (for example, researcher, farmer, government official etc.). The outcome is never definitive (it is always a work in progress), nevertheless an interpretation is made and inferences deduced, all the while trying to make as transparent as possible the standpoints that influence findings and conclusions (see Section 3.7.1 below for more detail on analytic narrative).

This chapter proceeds, first, by describing the statistical methods used to examine price fluctuations in time-series data. This is followed, second, by a description of the approach and field methods involved in sample survey research of farmers and traders in rural Malawi that was conducted from June to August 2008. Third, the chapter provides summary qualitative and quantitative data on the case-study communities of the field research, as well as the methods for selecting farmer and trader interviewees. Fourth, the chapter describes 'other methods' that have an important bearing on the provenance of the data used for time series work in the thesis; in other words, the methods used for price and quantity data collection by agencies of the Malawi government. Finally, the chapter describes additional methods that are important in particular parts of the thesis, and one of these is cointegration for examining spatial market integration in the Malawi maize market; and the other is analytic narrative, which comes into its own in the interplay between politics and economics associated with maize price spikes in Chapter 6 of the thesis.

3.2 Seasonal Analysis: Decomposing Seasonally Varying Time Series Price Data

The approach that is set out here follows the work of Goetz and Weber (1986), although these authors were building on ideas for distinguishing different influences on price variation over time from earlier contributors (for example, Kahlon and Tyagi, 1983). The basic idea behind decomposing a price series is that there are four main components contributing to the series, namely, a trend, a cyclical pattern, a seasonal pattern and a random or disturbance component. Intuitively one can think of the trend as reflecting general economic factors such as inflation or rising demand as population increases. In an open economy, it may also reflect international price trends for a commodity, mediated by a country's exchange rate. The cyclical pattern is most likely caused by unforeseen production fluctuations, typically ascribed to unusual weather patterns that may result in production being lower or higher than expected, depending on the nature of weather events. The seasonal pattern is the result of relatively costly storage needed in order to bridge a discontinuous flow of supply with a continuous demand for a commodity over an annual cycle. Finally, the random component can be thought of as events not captured by the other three components, which might include changes in government policy, and that in statistical terms are captured in the error term of a regression analysis.

The most common method for decomposing a raw price series is to assume that the four components are linked multiplicatively as follows:

$$P_t \quad = \quad (T_t) \times (C_t) \times (S_t) \times (R_t) \qquad (1)$$

Where, P is the price at time *t*; T_t the trend component at time *t*; C_t the cyclical component at time *t*; S_t the seasonal component at time *t*; R_t the random component at time *t*; and *t* is one month's average price observation. The interest of the analysis is the seasonal component. To isolate the seasonal component, the trend and cyclical components need to be removed from the price series:

$$S_t \times R_t \quad = \quad \frac{P_t}{T_t \times C_t} \qquad (2)$$

$$= \quad \frac{S_t \times R_t \times T_t \times C_t}{T_t \times Ct}$$

Step One: Moving Seasonal Average

The first step is to create a Moving Seasonal Average (MSA) of the P_t values, which is calculated by estimating T_t and C_t jointly, as $T_t \times C_t$. A moving average removes the random component if the random component is truly random so that the average of all the random components for all the observations should be zero. The moving average also removes the seasonal component if the moving average is for one season in length. 'Moving' average refers to the fact that the seasonal average changes with each observation. The strength of the MSA includes the ability to remove shorter-term fluctuations in the series caused by the random and price seasonality factors, which then allows one to concentrate on cycles (T_t) and trends (C_t) (Goetz and Weber, 1986). Each observation's seasonal average includes a half-season behind and a half-season ahead. The seasonal average is centred on each observation. For an annual commodity with a single rainy season, the season is defined as 12-months. The equation for calculating T_t and C_t will therefore be based on monthly average price data with a season length of 12-months.

However, an adjustment is required to this procedure since 12 months is an even number, and this does not allow the moving average series to be centred on individual months. This problem is overcome by averaging two different seasonal moving averages, one from $P_{t-6} \longrightarrow P_{t+5}$ and one from $P_{t-5} \longrightarrow P_{t+6}$. This results in Equation 3 below.

$$MSA_t = \frac{P_{t-6}+2(P_{t-5})+2(P_{t-4})+2(P_{t-3})+2(P_{t-2})+2(P_{t-1})+2(P_t)+2(P_{t+1})+2(P_{t+2})+2(P_{t+3})+2(P_{t+4})+2(P_{t+5})+P_{t+6}}{24}$$

$$= T_t \times C_t \tag{3}$$

The P_{t-6} and P_{t+6} values are the only values not multiplied by 2 because each of those months in a season loses one-half, since the season cannot be centred and the denominator is 24 (or 12 multiplied by 2) to take care of the half-seasons. The moving average technique means that values are lost at the beginning and end of the series. There is no moving average for the first and last six observations in the series. The MSA series created will then be a full season shorter than the raw price series.

Step Two: Seasonal Index

The Seasonal Index (SI) is computed as follows:

$$S_t \times R_t = \frac{P_t}{T_t \times C_t}$$

$$= \frac{P_t}{MSA_t} \tag{4}$$

$$\text{Seasonal Index} = SI_t = (S_t \times R_t) \times 100$$

The result is a fraction, which is standardised by multiplying by 100, creating an index number. If P_t equals its own MSA_t, then the SI_t will equal 100. There is one SI_t for each P_t. For an individual month in a 12-month season, a SI_t value of 115 would mean that month t price (P_t) is 15 per cent higher than the 12-month moving average. If the same calendar month in each successive season (i.e. SI_t, SI_{t+12}, $S1_{t+24}$……..) registers similar results of 115, we can be confident that this calendar month is typically 15 per cent above the annual average of 100, and of course this can be statistically tested. If no price seasonality exists, we should expect that all calendar months SI values would not be significantly different from 100. The seasonal index is free of inflationary effects because it is calculated as a ratio of moving seasonal averages: as such, the original prices series does not need to be deflated (Goetz and Weber, 1986).

Step Three: Grand Seasonal Index (GSI)

The final step in the seasonality analysis is to calculate what is called the Grand Seasonal Index (GSI). The GSI for an individual month is the mean of the same month's Seasonal Index (SI), for all the years included in the moving average time series. The GSI removes the random component, R_t, from the price series data. There is one GSI for each calendar month in the annual cycle. In this thesis, the seasonal analysis is conducted for 21 years of price data covering 1989 to 2009. The GSI is therefore represented by Equation 5 as follows:

$$GSI_m = \frac{I_t + S1_{t+12} + S1_{t+24} + SI_{t+36} + SI_{t+48} + \text{--------} + SI_{t+246}}{21} \qquad (5)$$

Where, m is the calendar month.

A curiosity of this procedure which is mentioned in all the sources is that rounding errors creep into the calculation such that an average taken of all the calendar months' GSIs seldom equals exactly 100, which is what it should do in order for the results to conform to the logic of the procedure involved. In other words, whereas the expected value of the sum of monthly GSIs across a calendar year is 1200 (12 months X 100) it often deviates from this in a minor but significant way, producing a number like 1195, for example. The recommended procedure for correcting this error is to multiply each month's GSI by a correction factor so that the adjusted total comes to 1200 as required. In the example just given, this correction factor would be 1200/1195 applied to all month's GSI level.

Test for Price Seasonality

Price seasonality is the statistically significant deviation of any GSI from the average value of 100. The null hypothesis (H0) is that price seasonality is not present, implying that the GSI is 100. The alternative hypothesis (H1) is that the GSI does not equal 100. It is then a two-tailed test. The test statistic is *t*, which is

$$t_{n-1} = \frac{\text{GSI - 100}}{\text{S} \div \text{n}^{1/2}}$$

$$= \frac{\text{GSI} - 100}{\text{S.E. (Mean)}} \qquad (6)$$

Where, n is the sample size, S is the standard deviation (of that calendar month's SI series), $S \div n^{1/2}$ is the standard error of the mean, and t_{n-1} the Student's test statistic for degrees of freedom n-1. The two-tailed t_{n-1} value (df = 20, 95 per cent confidence level or 0.05 alpha[22] level) is ±2.09. Values of t above ±2.09 mean the null hypothesis of no price seasonality is rejected. Price seasonality is then accepted.

Trend of the GSI and testing for its significance

Examining trends in the GSI and testing for their significance gives an idea of whether price seasonality is increasing or decreasing over time. Each calendar month's SI series can been regressed on an annual time variable representing the number of years in the data set. The *t* statistic can then be used to test the significance of the trend coefficient. The null hypothesis is that no trend exists and that β = 0. The regression equation is

$$SI_t = \alpha + \beta\,(\text{season}_s) + \varepsilon_t \qquad (7)$$

Where, SI_t is the set of the entire SIs for a particular calendar month; α, the intercept term; β, the trend coefficient; season_s is season 1 to the maximum number of seasons in the data set and ε_t, the error term. The t-values above ±2.09 indicate rejection of the H0

[22] Alpha is the cut-off point for determining significance. This is the proportion of the area in a graph that includes the critical region. Conventionally set at .05, .01, or .001 and is called a significance level. In the case of N-1 = (20-1) = 19, the alpha = .05 rejection region is 2.09 standard deviation from the mean. Stated in another way, if intervals were constructed at the 0.05 alpha levels, 95 per cent of them would contain the population value. The smaller the sample, the larger the value of the t ratio must be to claim significance (Walsh, 1990).

of no trend at 95 per cent confidence level or otherwise stated. A negative t- coefficient means that the GSI is declining.

3.3 Fieldwork Approach and Selection of Case-Study Sites

The purpose of the fieldwork component of the research underlying this thesis was to seek the researcher's own verification of the working of the maize market that could contribute to the understanding of the price instability question. Specifically, a lot of debate has occurred for Malawi, as for other low income countries in eastern and southern Africa, regarding the dynamism of the private sector, its diversity and competitiveness, its outreach, and overall its ability to deliver spatial, temporal and form efficiency in crop markets (Arlindo and Tschirley, 2003; Jayne *et.al*., 2006; Jayne *et al.,* 2008a; 2008b; Myers, 2008). For this thesis of particular importance is the capability of the private sector to undertake seasonal crop storage, and to minimise the temporal margin between post- and pre-harvest prices consistent with carrying out the storage function effectively. In addition, the position of farmers at harvest time seems critical, in respect of the choices that they possess between traders and their ability to seek and obtain the best prices available. In this discussion, it must be borne in mind that at the most local level of marketing small traders are mainly farmers themselves, taking advantage of the volume of activity in marketing at harvest to supplement their farming livelihoods. In the case of Malawi, recent findings by other researchers on these attributes of diversity, competition and structure are summarised in Chapter 5 in the context of presenting the researcher's own findings.

The basic methodological concept for the research was the notion of a 'snowball' investigation (Browne, 2005), in which farmer respondents would be asked to whom they had sold their maize, then the trader purchasers would be asked to whom they had sold the maize, and so on up the marketing chain. In marketing studies, this is sometimes referred to as the 'linked interview' or 'follow-the-bag' methodology (Magrath, 1999). A significant risk of such an approach is that the trail fizzles out quite quickly from its starting point: for example, the farmer respondent takes his or her own produce to a marketplace where its identity disappears amongst all the other exchanges going on; or this occurs after just one stage in the chain. For this reason, 'follow-the-bag' research needs to be supplemented by separate interviews with traders of differing sizes operating in different segments of the vertical marketing system.

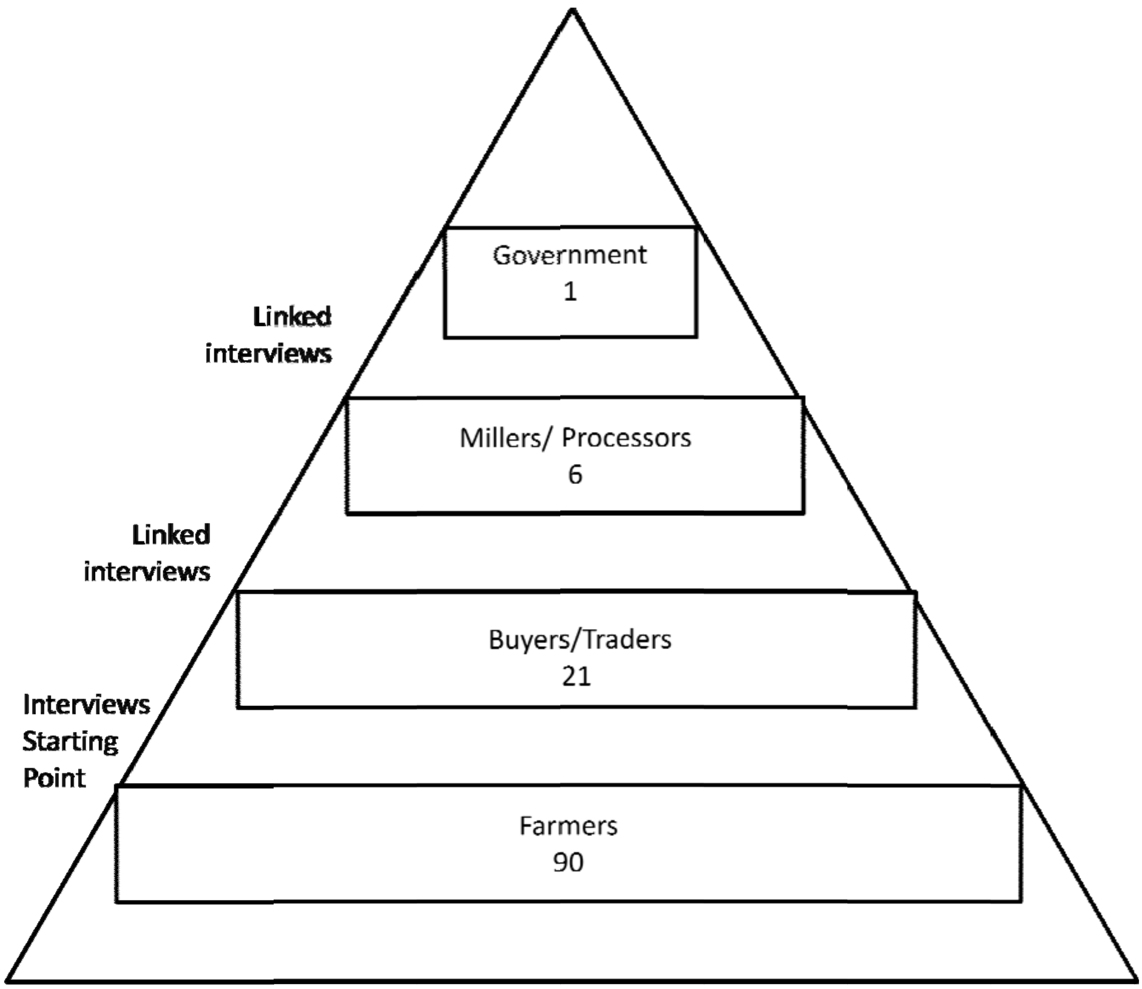
In the fieldwork for this research, a second major problem manifested itself. Villages were selected for study on the basis of early estimates of expected maize harvests in different parts of Malawi in the 2007/08 crop season (see below). However, in the event the 2008 maize harvest was not nearly as large as had been predicted earlier (as discussed in Chapter 6, a lot of uncertainty surrounds the true level of maize output in that crop season). This meant that fewer than expected farmer respondents in the sample turned out to have surplus maize to sell, and this affected considerably the size of the eventual sample that allowed vertical marketing margins to be pursued.

Nevertheless, 'follow-the-bag' was by no means the only dimension involved in asking farmers and traders questions about how the maize market worked for them. Separate questionnaires were developed for farmer and trader interviewees, and these asked a spread of questions about maize output, own maize consumption, maize sales, choice in sales decisions, prices obtained, storage, and so on. The relevant questionnaires are provided as appendix I at the end of this thesis, and descriptive statistical analysis of the data collected from the sample surveys is provided in Chapter 5.

Figure 3.1 below summarises the pyramid structure of the research as far as it turned out possible to pursue the follow-the-bag method. A total of 90 farmer respondents were interviewed, these being divided equally between 3 field sites, one each in the south, centre and north of the country. These 90 farmer respondents yielded 21 buyer or trader respondents that were followed for linked interviews. Finally, the 21 buyer or trader respondents either directly or indirectly led to interviews with 6 larger millers or food processors in the maize marketing system, and one senior government officer, who were interviewed using a semi-structured set of questions based on the trader questionnaire.

The sampling procedure for the fieldwork component of the research began with the selection of one district in each of Malawi's three regions. These districts were purposively chosen to represent broad criteria of geographical spread (across the country), engagement in maize production (true of the whole of Malawi, but with variations in significance in different districts), and a degree of variation in relative poverty or wealth, and proximity or remoteness from the main road transport network. The districts chosen were Mulanje in the south, Mchinji in the centre and Mzimba in the north (see Figure 3.2 below for the stages of sampling that occurred from this point). One case-study village was selected in each of these districts, based on a staged sampling process oriented towards maize output estimates for the 2007/08 crop season. In the first stage, the District Agricultural Development Officer (DADO) in each district selected an Extension Planning Area (EPA), which was considered the highest maize producing EPA in that district. On this basis, three EPAs were selected as follows: Milonde in Mulanje district, Chiosya in Mchinji district, and Champhira in Mzimba district.

Figure 3.1: Pyramid Structure of Market Sample Survey



Source: Fieldwork in three villages conducted by the author May-August 2008

In the second stage, a section (administrative sub-unit) within each EPA was selected by taking the highest estimated maize production section in the EPA. Table 3.1 below illustrates this procedure for Chiosya EPA in Mchinji district, where the predicted maize output for Chinteka section was the highest in the EPA, and therefore Chinteka was selected. In the third stage, the village with the highest predicted maize output was selected, which in the case of Chinteka section was a village, called Chinteka 2 (out of

37 villages in the section). The same procedure was followed in each EPA and section to arrive at the three case-study villages of Mission in the south, Chinteka 2 in the centre, and Jenda Theu in the north. For the sake of clarity and brevity, these villages from hereon are referred to as Mission, Chinteka and Jenda rather than by their full names.

Figure 3.2: The Sample Selection Procedure for Villages and Households

	Region	
Southern	Central	Northern
	District	
Mulanje	Mchinji	Mzimba
	EPA	
Matola 1	Chiosya	Champira
	Section	
Milonde	Chinteka	Jenda
	Village	
Mission	Chinteka	Jenda

Sample

Mission No. of HHs		**Chinteka No. of HHs**		**Jenda No. of HHs**	
Very Rich	0	Very Rich	2	Very Rich	0
Rich	6	Rich	3	Rich	10
Upper Middle	7	Upper Middle	5	Upper Middle	3
Lower Middle	7	Lower Middle	6	Lower Middle	9
Poor	10	Poor	14	Poor	8
Total	30	Total	30	Total	30

Source: Fieldwork in three villages conducted by the author May-August 2008

Thus, the most important criterion in moving from a district to a village to conduct fieldwork was predicted maize output at the next harvest. These are forecast quantities at each administrative level arising from an overall method for making future harvest predictions in Malawi that is described later in this chapter at Section 3.6.2. For the selection of farm households in each village, it was decided to stratify the intended random sample of 30 farmers according to their relative poverty or wealth as discovered by a participatory wealth ranking exercise undertaken in each village (see below). This idea contained plausible arguments in its favour, principally the intention to capture the maize marketing experience of farm households of varying socio-economic status in the Malawi rural economy. On the other hand, a defect of the approach that came to light once the research got underway was that less well off farm households tended not to participate in grain sales at harvest, and therefore were not able to offer insights into marketing experiences. This compounded the problem previously mentioned that the

Table 3.1: Study Village Two Stage Selection Process Based on Expected 2007/08 Maize Production

1st Stage Section Selection Chiosya EPA			2nd Stage Village Selection Chinteka Section		
Name of Section	**Size of Land (Ha)**	**Production (Tons)**	**Name of Village**	**Size of Land (Ha)**	**Production (Tons)**
Chinteka	808	1098	Kwacha uname	41	85.8
Chioko	649	882	Kanjhande	10	20.9
Chitcha	801	1089	Dothi	31	64.9
Chitithi	427	580	Tilinje	51	106.7
Kamwendo West	543	638	Katewera	42	87.9
Kasitu	561	662	Mwinjiriro	22	46.0
Zulu East	582	737	Katundwi	18	37.7
Zulu West	381	518	Karonga	42	87.9
			Katakungwa	14	29.3
			Langwana	68	142.3
			Kasauka	33	69.0
			Chalenga	52	108.8
			Changata	67	140.2
			Chinkhanga	45	94.1
			Chikomeni	74	154.8
			Sinosi	49	102.5
			Zonzi	9	18.8
			Machisa	13	27.2
			Malizani	37	77.4
			Simphesi	32	66.9
			Msuzi	42	87.9
			Mndakwa	106	221.8
			Kaswasata	12	25.1
			Mundina	39	81.6
			Chingwalu	57	119.2
			Kwawe	63	131.8
			Kamangira	169	353.5
			Kawala	26	54.4
			Kabaira	80	167.4
			Chinteka 2	211	441.4
			Chinteka proper	58	121.3
			Jombo	20	41.8
			Bololo	22	46.0
			Belo	33	69.0
			Chikoyi	19	39.7
			Waya	19	39.7
			Kazambala	112	234.3

Note: Shaded names are names of selected section and village in Chiosya EPA and Chinteka Section.
Source: Chinteka Section, MOAFS 2nd round crop estimates 2008.

actual levels of maize harvest in 2008 were lower than the predicted levels so less maize sales were occurring all round in the 2008 harvesting season than was expected at the start of the fieldwork. Figure 3.3 below shows where the case-study districts and villages are located on a map of Malawi.

3.4 Participatory Wealth Ranking

As already mentioned, participatory wealth ranking was used in the fieldwork as a means of stratifying the farmer sample in the follow-the-bag methodology. However, this technique has more powerful purposes in field research in poor countries than this rather mechanical objective (Grandin, 1988). It can be utilised to obtain a broad understanding, not only of social and economic difference at a particular instant in time, but also in terms of changes in wealth status that have been occurring over time. In general participatory wealth ranking can be used:

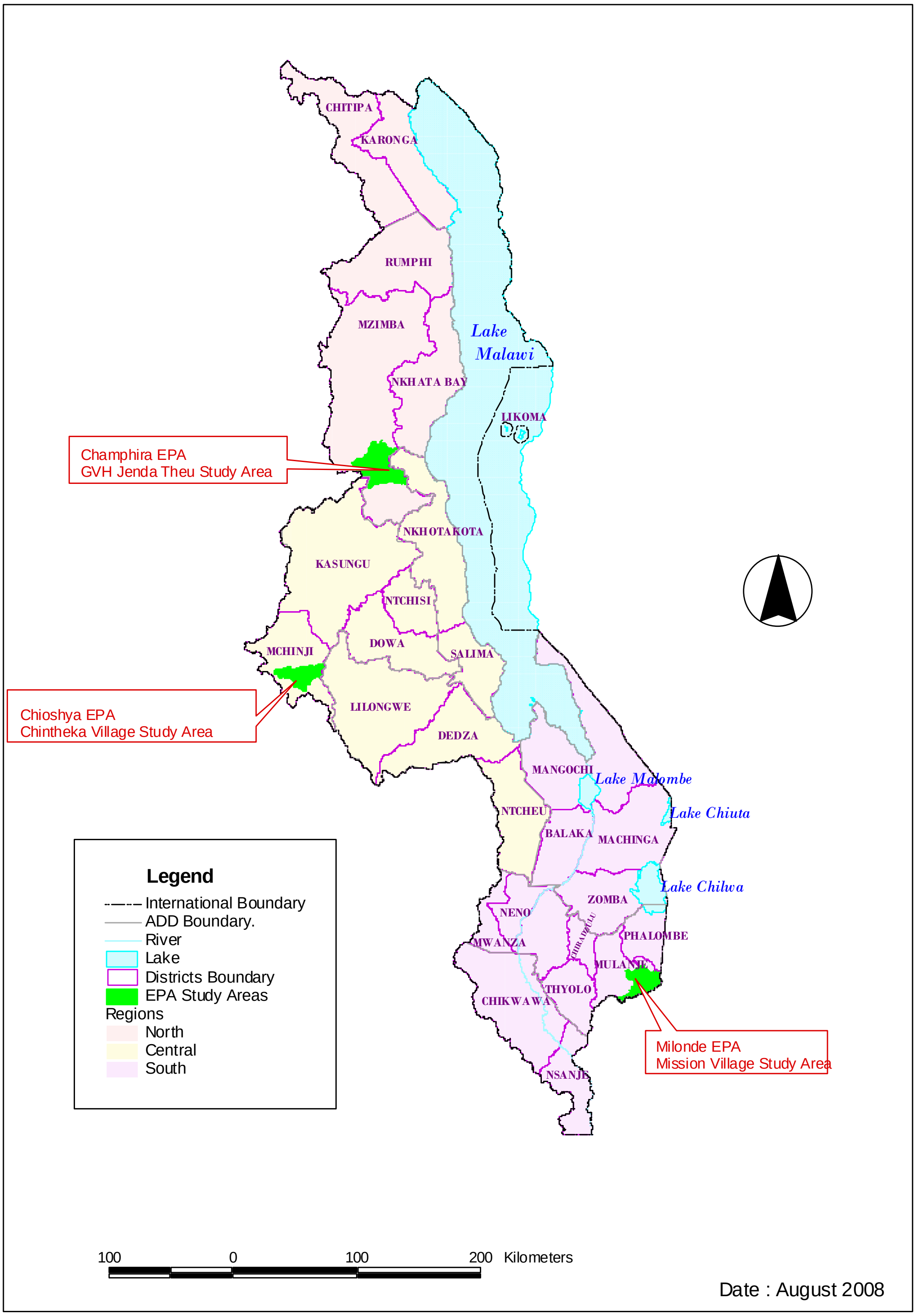
(a) to distinguish households or families in a community by their relative poverty or wealth, according to criteria widely held in the community itself;
(b) to gain information on the asset and activity patterns that distinguish different poverty-wealth groups;
(c) to learn more about disadvantaged groups and social exclusion;
(d) to find out about movements between poverty-wealth groups: how prevalent is such movement, are people moving up, down, or in both directions;
(e) to discover the reasons that some people are able to move upwards and others move downwards.

Wealth ranking typically comprises a sequence of steps (Grandin, 1988; Ellis and Woldehanna, 2005) which were followed in the implementation of the method in the case-study communities:

1. Four or five key informants were selected, on the basis of their being identified as long-standing community members. If a chosen informant was reluctant to participate in the exercise, they were replaced by another person. It was sought to achieve gender, age and other balances amongst the informants (men and women, young and old, educated and non-educated, etc).

2. The nature of the research was explained to the key informants, and the value of identifying and knowing about the different problems of rich and poor families through the wealth ranking exercise.

Figure 3.3: Map of Malawi Showing Study Areas



Source: MoAFS, Department of Land Resources Conservation (2008)

3. The informants discussed and reached agreement on:
   - the local concepts and language for describing poverty and wealth (or well-being),
   - the initial identification of different wealth groups (the number of such groups, and the criteria that distinguish one group from another),
   - the working definition of a household including female-headed households, single person households and homeless families.

4. A list was compiled of all the households in the community with the help of key informants and village headmen in each study village.

5. Households were ranked, as follows: each household's name was written on a small card and the cards were shuffled. One member of the key informant group called out the name of the household on the card and passed the card to the rest of the group to add to the pile representing one or other of the wealth groups identified in step 3.

6. The assignment of each card was followed by the question: 'Why is this household in this group and not in another?' As the reasons unfolded, they were added to the list of wealth and well-being characteristics attributed to the different groups and listed down the left-hand column of the table in which field notes of the exercise were being entered.

7. The ranking was then verified as follows: when all cards had been assigned, the names in each group were read out to the key informants to verify that each household was in the right group. When disagreement was voiced; through discussion, the household either stayed in the same group or moved to another group as required.

8. A random selection of 30 households was carried out by putting the cards for the households belonging to each wealth ranked group into a separate bag and randomly selecting from the bag the number of households (out of 30) that represented the proportion of that group in the community as a whole.

9. After household selection, the facilitator asked the key informants, for each selected household, whether that household ha moved between groups, or stayed in the same group, over the last five years. “Upward” and “downward” movements and the reasons for such movements were recorded against the list of selected sample households.

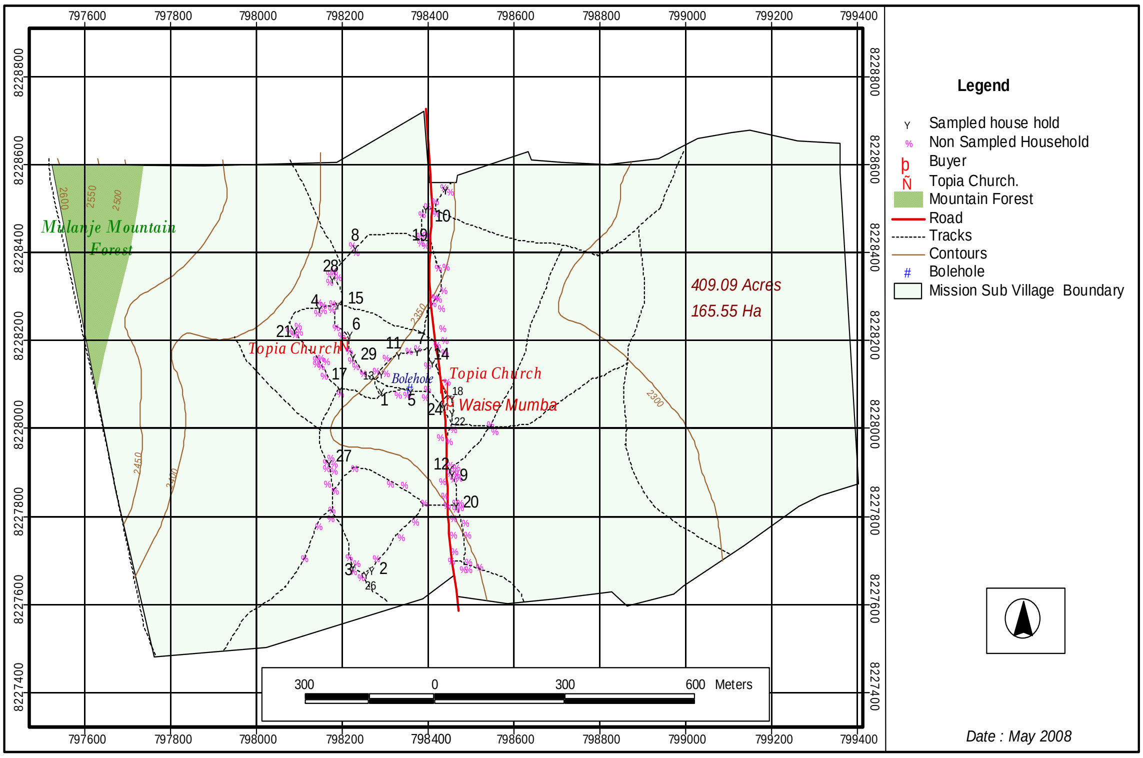
It should be noted that wealth ranking is a relative exercise that yields knowledge about socio-economic differences at the level of each community within which fieldwork is conducted, but does not necessarily yield comparability across communities, especially when they are in different parts of the country. One obvious difficulty is that different numbers of wealth groups may be chosen in different research sites (typically within the range of 3 to 6 wealth groups). Another is that the boundaries between groups that determine the assignments of households into specific groups can differ, with quite small differences in interpretation e.g. the number of goats that signifies being rich compared to being middle, potentially making significant differences in the proportion of households assigned to different groups. Having said this, it is nevertheless true that patterns of commonality are frequently observed in wealth ranking, especially with respect to what constitutes being ‘poor’ as contrasted with what constitutes being ‘rich’.

3.5 The Case Study Villages

Mission Village

Mission village is located in the Southern Region of Malawi in Mulanje district, and is part of the Ngara section of the Milonde EPA. The district has nine agro-ecological zones as follows: Chilwa Bottomlands, Phalombe Plain Uplands, Thuchila Plain, Nswadzi Valley, Lower Ruo Valley, Luchenza Plain, South Mulanje Plain, Mount (Mt) Mulanje Foot slopes and Mt Mulanje (Paris, 1991a). Milonde EPA is in South Mulanje Plain, which has highly acidic clay soils, which are very deep, well drained, strongly weathered and highly leached. It receives 1200 to over 2000 mm rainfall per year and for this reason is suitable for Arabica coffee, moderately suitable for tea and maize, and marginally suitable for a number of other crops. However, Mission village is not a tea or coffee growing village; it is distinguished agriculturally by the predominance of maize, with groundnuts and cassava making important contributions to total agricultural output. Of the three research villages, Mission village is the most densely populated, with a district population density of 254 people per sq km (Government of Malawi, 2008b). An important consideration for research into maize marketing and price seasonality is the proximity of the village to the border between Malawi and Mozambique, since maize flows relatively freely across this border and maize movements from Mozambique into Malawi are especially prevalent early in the harvest season (since maize in the adjacent areas of Mozambique tends to mature earlier than in Malawi). The main language in Mission village is Chichewa. The village is the most food-insecure and has the lowest livelihood indicators of the three research villages. Figure 3.4 shows the geographical layout of Mission village. The administrative boundaries of the village enclose a total land area of 165.6 ha. The topography is undulating, bisected by streams arising from Mt Mulanje, the 3002m massif that lies to the north-west of the village (Paris, 1991a). The village is fairly spread out, with homesteads scattered along a gravel road that runs north to south. The location of the sample households is shown on the map. In terms of institutions and services, the village has one topia church, one small shop and a borehole.

Figure 3.4: Map of Mission Village



Source: Fieldwork in Mission Village conducted by the Author May-August 2008

The participatory wealth ranking in Mission village was conducted on all of the 205 households in the sub-village as identified by the key informants and village leaders. In this instance, the key informants identified four distinct wealth groups. The criteria for distinguishing one group from another comprising housing quality, degree of food security (defined as the number of months a family could feed itself from its own supplies), livestock owned, land owned, whether labour was hired in or hired out by the household, other assets owned and the nature of non-farm enterprises engaged in by family members. The results of the exercise are summarised in Table 3.2.

Table 3.2: Characteristics of Wealth Groups in Mission Village

Ranking Criteria	**GROUP 1**	**GROUP 2**	**GROUP 3**	**GROUP 4**
Share Total	36 HHs (17. 6 %)	50 HHs (24. 9%)	47 HHs (22.9%)	72 HHs (35.1%)
House quality	burnt brick walls, iron or thatch roof	unburnt bricks, well built thatched roof	mud walls, thatch roof	dilapidated house, or homeless
Food security	food secure 7 to 8 months of the year	food secure 7 months of the year	food secure 3 months of the year	food deficit 12 months
Livestock	9 goats, 50 chickens, 15 ducks, 4 turkeys, 4 guinea fowl	5 to 8 goats, 10 to 15 chickens, 8 to 15 ducks, 4 turkeys, 4 guinea fowl	3 to 4 goats, 5 to 14 chickens	no livestock
Labour market	hire labour seasonally	hire labour seasonally, but also sells labour	rely on seasonal *ganyu*	rely entirely on *ganyu*
Land owned	average 0.6 ha, may rent some land out	0.10 ha acres	do not own land	do not own land
Other assets	bicycle, radio, cassette, cell phone, bed	metal plates, radio, wooden bed	sleep on mats	sleep on rags
Business	grocery shop, trader	trading sugar cane, sweet potato, local beer	no business	no business

Source: Fieldwork in Mission village conducted by the author May-August 2008

Households selected for the sample were asked whether their livelihood circumstances had improved, stayed the same or deteriorated over the past five years. A small majority of households (17 out of the 30 in the sample) said that they had stayed the same or improved due to improvements in the outcome of their farming activities, while the other 13 households had for one reason or another experienced deteriorating circumstances. The main reasons given for the latter were sickness and old age, with being widowed while looking after small children also a factor mentioned.

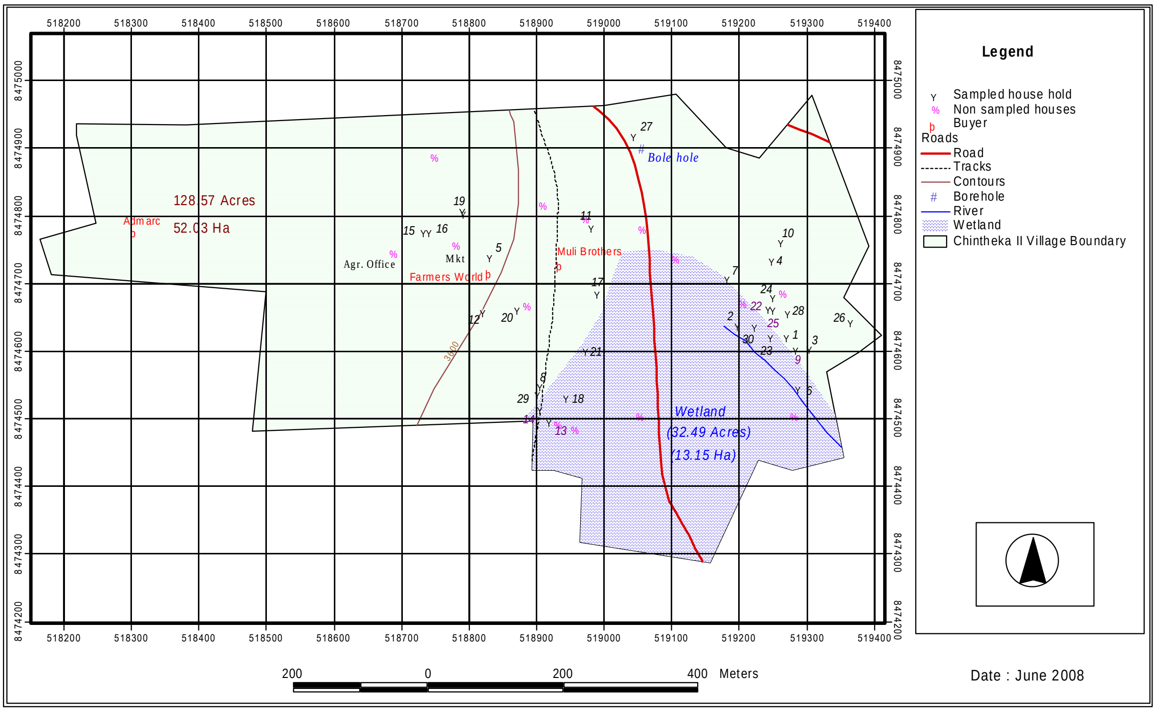
Chinteka Village

Chinteka village is located in the Central Region of Malawi in Mchinji district. It is part of the Chinteka section of the Chiosya EPA. Mchinji district has a moderate population density of 136 people per sq km (Government of Malawi, 2008b). The district is distinguished chiefly by its five agro-ecological zones, namely the South and West Kasungu Plain, Upper Bua Plain, Kochilira-Kazyozyo Plain, Mchinji Hills and Mchinji Foothills. The district is bordered by Kasungu district to the north, Lilongwe district to the east and Zambia to the west. Chiosya EPA is on the Kochilira-Kazyozyo Plain and occupies 45,450 ha (Paris, 1991b). It has gentle slopes, slight erosion and fluvial and colluvial soil deposits which are mainly deep, well drained, brown and coarse textured with very low chemical fertility. Chinteka village grows tobacco and groundnuts. The area is also moderately suitable for maize and marginally suitable for cassava. An important consideration for research into maize marketing is that for marketed crops, maize takes second place to tobacco in this village. The main language in Chinteka village is Chichewa. The village is fairly food-secure and has better livelihood indicators than Mission. Figure 3.5 shows the geographical layout of Chinteka village.

The administrative boundaries of the village enclose a total land area of 65.2 ha, of which an estimated 13.2 ha is wetland and 52.0 ha is arable land suitable for crop cultivation. The village is fairly spread out, with homesteads scattered throughout the entire village and a large wetland area that is used for winter cropping. The location of the sample households is shown on the map. In terms of institutions and services, the village has a borehole for its water supply, an agricultural office that houses the Chiosya EPA, a primary school, a community day secondary school, a trading centre with several small shops, a large private sector, agricultural produce buyers and several small-scale produce traders. The participatory wealth ranking in Chinteka was conducted on all of the 110 households in the village identified by the key informants and village leaders. In this village, the key informants identified five distinct wealth groups by their own criteria for distinguishing one group from another (Table 3.3).

Again in Chinteka village sample households were asked whether their circumstances had improved, stayed the same, or deteriorated over the preceding five years. Just under half the sample stated that their livelihoods had stayed the same or improved, citing improved returns to farming, especially for tobacco, groundnuts, tomatoes and meat. Interestingly, maize was not mentioned amongst these reasons, despite the presence of fertilizer subsidies under the AISP. Over half the sample (17 households) considered that their livelihoods had deteriorated, citing lack of credit, alcohol abuse, family breakdown, old age and sickness as the chief causes for this.

Figure 3.5: Map of Chinteka Village



Source: Fieldwork in Chinteka Village conducted by the Author May-August 2008

Jenda Village

Jenda village is located in the Northern Region of Malawi, in Mzimba district and is part of the Jenda section of the Champhira EPA. The district has a population density of 70 people per sq km (Government of Malawi, 2008b). Mzimba district is characterised by undulating to rolling relief plains. The district relies on subsistence farming of maize, vegetables and beans for cash and food and rearing cattle and growing tobacco for cash. The district has four ecological zones based on different soil groups: Euthini-Embangweni plains, Emcisweni plain, Upper South Rukuru plain and Mzimba hills. Champhira EPA is in Euthini Embangweni plains. The plains are gently undulating or nearly flat with smooth topography, which is often interrupted by SE-NW trending-elongated dambos or streams; and gneisses of the basement complex and old alluvial deposits underlie the plains. It has very deep, well-drained, medium- to fine-textured soils in the southern and north-western parts of the plain and very deep, well-drained, coarse and medium- textured brown soils in the northern part of the plains and along the dambos. It receives 700-900 mm of rainfall annually. The dominant land use and vegetation is seasonally wet grassland in upland drainage systems, with dambo landform and flat to almost flat topography with no cases of erosion. Champhira EPA has a total area of 88,300 ha of which 21 per cent is forest reserve (Paris, 1991c).

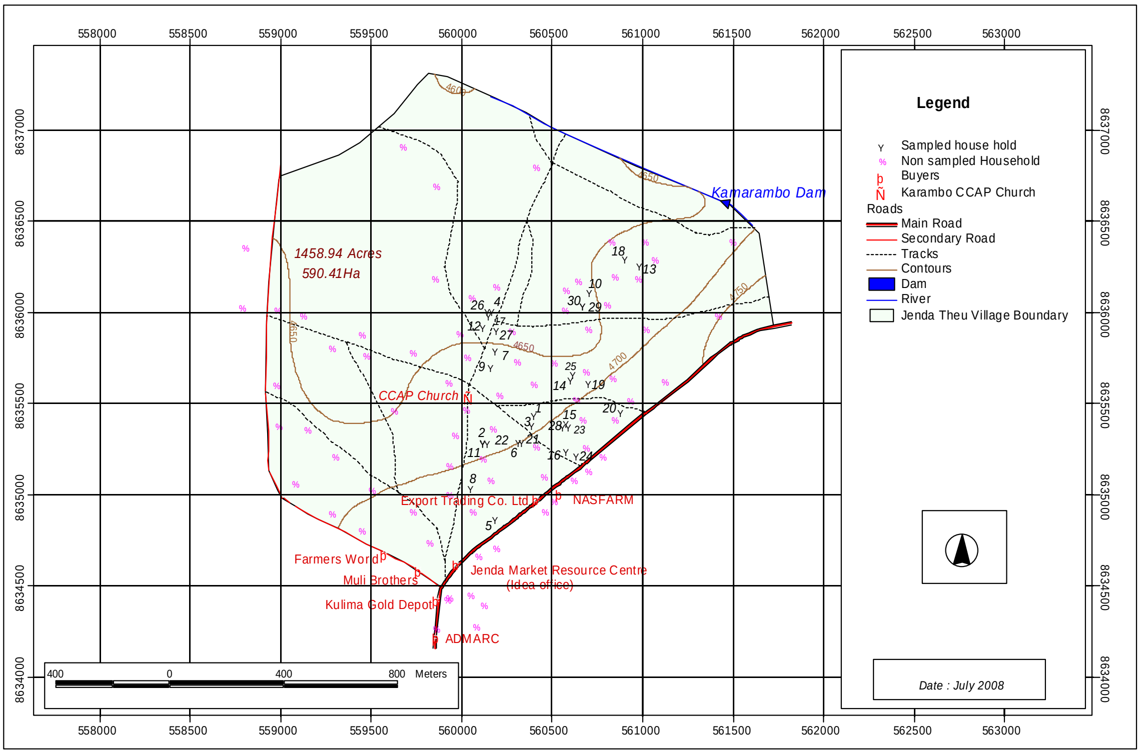
Table.3.3: Characteristics of Wealth Groups in Chinteka Village

Ranking Criteria	**GROUP 1**	**GROUP 2**	**GROUP 3**	**GROUP 4**	**GROUP 5**
Share in Total	8 HHs (7.37 %)	11 HHs (10.00%)	19 HHs (17.3%)	20 HHs (18.18%)	52 HHs (47.3%)
Food Security	harvested 15 or more farm carts of maize, food secure 10 to 12 months	harvested 9-14 farm carts of maize, food secure 8 to10 months of the year	harvested 5-9 farm carts of maize food secure for up to 5 months	harvested 2-4 farm carts of maize, food secure for up to 3 months	harvested up to 1 farm cart of maize, food secure for up to 2 months.
House Quality	burnt brick walls, iron roof, cement floor	burnt bricks, iron roof, mud floor	mud walls, mud floor, thatch roof	mud pole house	thatch roof, reeds door
Livestock	5-15 cattle	5-8 goats	5-6 chickens, 5-6 ducks	pigeons	no livestock
Labour market	hires labour seasonally	hires labour seasonally *(ganyu)*	relies on *ganyu*	relies on *ganyu*	relies entirely on *ganyu*
Land owned	2.02 -4.05 ha	1.21-1.62 ha	0.81-1.21 ha	0.40-0.81 ha	0-0.40 ha
Other Assets	sofa set, television, dining set, radio cassette, bicycle, table, chair	radio cassette, bicycle, table, chair	radio, chair	sleep on reed mats	sleep on rags
Business	grocery, agro-dealer	tearoom, bottle store, beer	chips, fish, barber shops	doughnuts, tomato, banana	cuts grass and firewood

Source: Fieldwork in Chinteka Village conducted by the author May-August 2008

Figure 3.6 shows the geographical layout of Jenda village. The administrative boundaries of the village enclose a total land area of 590.4 ha. The topography is fairly flat plain with some sloppy areas. The soils are not suitable for the growing of many crops because of high erosion in the area, apart from some undulating areas that are highly suitable for Irish potatoes and moderately suitable for citrus, groundnuts, maize, beans, sunflower, tobacco and wheat. The village is along the M1 road. The households

Figure 3.6: Map of Jenda Village



Source: Fieldwork in Jenda Village conducted by the author May-August 2008

are fairly spread out throughout the entire village. The location of the sample households is shown on the map. In terms of institutions and services, the village has a borehole for water supply, a primary school, a community day secondary school, a rural health centre or clinic, a trading centre with several small shops including one chain store (the People's Trading Centre), large private sector agricultural produce buyers, several small-scale produce traders, electricity, a filling station selling paraffin, petrol and diesel, a rural police unit and, a tarmac road and a good transport network with well-established bus companies connecting Jenda to Lilongwe and Mzuzu and the Tanzanian border which operate from Jenda and from Karonga/Mzuzu and Lilongwe, with stopovers at Jenda.

The participatory wealth ranking in Jenda village was conducted on the total number of 68 households living in the village as identified by the key informants and village leaders. In this instance, the key informants identified four distinct wealth groups (Table 3.4). In Jenda village only 11 out of the 30 sample households considered that their circumstances had remained the same or improved in recent years, despite this being the wealthiest of the three villages overall. Reasons for keeping in the same position or

Table 3.4: Characteristics of Wealth Groups in Jenda Village

Ranking Criteria	**GROUP 1**	**GROUP 2**	**GROUP 3**	**GROUP 4**
Share in Total	22 HHs (32.4%)	5 HHs (7.4%)	23 HHs (33.8%)	18 HHs (26.5%)
Food Security	food secure all year round	food secure 8 to 11 months of the year	food secure 2 to 7 months of the year	food secure 0 to 1 months of the year
House quality	burnt brick walls, iron roof, cement floor, white wash	burnt bricks, iron roof, mud floor	burnt bricks, thatch roof, mud floor	unburnt bricks, mud walls, dilapidated
Livestock	15 or more cattle, 7 goats , 16 pigs	12 to 14 cattle, 4 to 6 goats, 12 to 15 pigs	4 to 11 cattle, 2 to 3 goats, 4 to 11 pigs	no livestock
Labour market	hires labour all year round	hires labour seasonally	sells labour	receive safety nets from government
Land owned	4.05 to 6.47 ha	2.43 to 3.64 ha	0.40 to 2.02 ha	0 to 0.20 ha and rents land to grow crops
Other assets	sofa, farm cart, bicycle, TV, satellite dish, DVD, plough, ridger, sprayer, ceramic plates, steel pots, clay pots, cell phones	bicycle, radio, table, chair, simple sofa, sprayer, ceramic plates, clay pots, cell phones	reed mats, metal plates, clay pots, cell phones	plastic plates , clay pots, no cell phone
Businesses	producing and selling tomato, onions, beans, Irish potatoes, maize mill	producing and selling sweet potatoes, beans, tomato	producing and selling sweet potatoes	producing and selling local beer

Source: Fieldwork in Jenda Village conducted by the author May-August 2008

improving were almost all agriculture related and tomatoes, onions, beans, maize and cattle were cited as contributing to stable or improving livelihoods. Households who felt that their livelihoods had deteriorated cited old age, lack of capital, alcohol abuse, and (interestingly) the sale of fertilizer obtained under the AISP as the reasons for their diminishing livelihood positions.

Comparison Across Villages

The wealth ranking provides useful insights into similarities and differences between the study sites that are pertinent for the interpretation of findings about agricultural marketing that are provided in Chapter 5 of the thesis. It is notable that relatively few families across all three villages are food secure in maize alone (although this is, of course, rather a limited view of food security). In Mission village not even the highest wealth group are considered by their peers to be fully food secure, while in Chinteka and Jenda villages the top wealth group is defined in part by its achievement of food security through maize but corresponds to only 8 and 32 per cent of households in each of those villages respectively. All remaining households, in all villages, only produce enough maize to last up to 8-10 months of the year, and otherwise depend on other strategies, principally *ganyu* work for cash or kind. Given that sample households were drawn proportionally from wealth groups, this also shows why surplus producing farmers who sold maize turned out to be rather a small proportion of the overall sample across the three villages.

Aside from the food security issue, the villages follow a clear ordering in relative overall wealth, with Mission clearly being a poorer community than Chinteka, and the latter being poorer than Jenda. Many of the features of Jenda that emerge from the wealth ranking and are also pertinent in Chapter 5 arise from its position on the main north-south road running through northern Malawi, thus giving rise to a lot more non-farm activities, and much easier access to transport and communications than the other two villages. In other respects, relative poverty and wealth is displayed strongly, as expected, through asset levels, including livestock types and numbers, land owned, household assets like bicycles and radios, and housing quality. On all these counts, wealthier households in Jenda appear to be considerably better off than their equivalents in the other two villages.

Regarding positive or negative changes in livelihoods, it is interesting that households across the villages who considered that their circumstances were stable or improving tended to mainly cite agricultural success as the reason for this. On the other hand, households who felt under pressure, or deteriorating circumstances, commonly cited old age, family troubles, and ill health as the principle reasons. Of particular note was the extent to which excessive alcohol consumption was mentioned as a reason for the impoverishment of households.

3.6 Malawi Government Data Collection Methods

This thesis draws heavily on official Malawi government data on various important variables related to maize and other crop markets. The chief such variables or data sets are retail prices for food commodities (especially maize), maize output estimates, and the national food balance sheet which brings together the demand and supply for staple foods. It is just as well for the methods involved in the collection or estimation of these data are well understood, since the methods themselves may have important bearing on the confidence with which the researcher can treat government data and the analytical results that follow from such data. In the following sections, a brief summary is given of the background and methods involved in government data collection of prices, production and the national food balance sheet.

3.6.1 Crop Retail Price Collection

In view of the central focus of this thesis on price instability, it seems appropriate here to provide an outline account of the collection of commodity prices by the Ministry of Agriculture and Food Security (MoAFS) in Malawi, including known weaknesses in the long-term commodity price series. The current agricultural price data system in Malawi dates from 1988 when the government embarked on market liberalisation policies in the agricultural sector. At that time the Pricing and Marketing section of the Planning Department in MoAFS and the Inter-Ministerial Price Advisory Committee that used to set agricultural prices changed their role from setting minimum and maximum pan-territorial and pan-seasonal agricultural prices to one of monitoring the implementation of market liberalisation. Price collection instead of price setting then became the major preoccupation of the Price and Marketing unit. Through the Agro-Economic Survey, MoAFS currently collects retail prices, farm gate prices, horticultural produce and livestock prices from 80 markets scattered across the country on a weekly basis and produces monthly average prices. This information is disseminated on a weekly basis via email to various institutions, and via SMS in partnership with the Initiative for Development and Equity in African Agriculture (IDEAA) and Malawi Agriculture Commodity Exchange (MACE).

The data collection that started in 1988 was funded by the World Bank as part of an Agriculture Marketing and Estate Development project. Price information was initially collected in 32 selected markets. This project ran up to 1995. The information was disseminated through the radio and newspapers once a week. When the project was phased out, the Ministry was unable to sustain the cost of dissemination, but continued to collect the prices. Since then, price collection has come under the umbrella of the Agro Economic Survey, and funding has been forthcoming from a variety of donors for different purposes, but not always very consistently.

In 2005, some problems regarding MoAFS retail price collection were noticed. The first problem was the observation of unusual variations in prices between markets, and for the same markets at different time intervals, which did not 'fit' expected spatial and temporal patterns. A second problem was missing data. Investigation revealed that the main cause of the first problem was variations in units of measurement, since buyers and sellers in markets use a wide variety of measures in transaction (heaps, plates, kilos, buckets, sacks). The second problem was attributed to the fact that particular commodities were not always available in all markets, hence price data could not always be collected for them (IDEAA Malawi, 2005). In view of especially of the first of these challenges, MoAFS and IDEAA worked on improving the price collection methodology, with funding from the United States Agency for International Development (USAID). In addition, the USAID project funded the provision of mobile phones to MoAFS enumerators, so that prices could be transmitted directly by SMS into the IDEAA SMS platform, with simultaneous phone transmission to the Agro Economic Survey.

What follows next is a description[23] of the actual methodology for collection of the retail price data in the field. The retail price survey captures retail prices of food crops such as maize, rice, cassava, sorghum, millet, groundnuts, beans, peas, and meat and meat products e.g. pork, goat meat and beef. The survey originally covered 32 markets, then it expanded to 38 markets and as of 2009 it covered 80 markets across Malawi of which 72 markets are used in the calculation of monthly average prices. A retail price

[23] The description provided here was the price collection procedure in effect until December 2009. Since then new changes have been implemented which increase the markets covered to 200.

questionnaire is the tool used to collect the prices (Government of Malawi, 2003). It has the following sections (see Table 3.5):

- *Identification Panel:* This captures the source of data that include ADD name, market name, whether it is district or a town market, enumerator name and the date on which the data is collected.
- *Checker Panel:* The supervisor who is based at the Agro – Economic surveys office checks the price data collected by the field staff.
- *Column 1 Produc*e: This column lists all the commodities on which data for retail prices must be collected e.g. maize, rice, cassava, millet, groundnuts, beans, peas, goat meat, pork and beef.
- *Column 2 Trial*: The prices are collected three times a day at each market once in the morning, at noon and in the afternoon at the following times: 8-9 am, 11-12pm and 3-4 pm.
- *Column 3 Measuring Unit:* The enumerator records the price of the commodity charged per local unit of measure as provided by the seller. He then uses the standard unit of measure in this case 10-litre bucket to standardise the weight by counting the number of local units of measure that fill the 10-litre bucket in order to calculate a standardised weight of the commodity for the local unit of measure.
- C*olumn 4 Weight*: The actual weight of the commodity that fills the 20-litre bucket in kgs or grams is recorded.
- C*olumn 5 Prices*: This column requires the enumerator to record the prices of the commodity according to the weight in column 4. The enumerator then uses the price of the commodity in a standardised unit of measure (10-litre bucket) and the weight of the same commodity to calculate the price per kg or gram, and calculates the weight of the commodity in a local unit of measure. The enumerator does not need to standardise the units every week because now when prices change on the market when the local unit of measure remains constant, the enumerator just calculates the new price per kg. The enumerator will have to do standardisation again when the local unit of measure has changed. Accuracy in reporting the price and weight of the sample is extremely crucial for this exercise. Hence, enumerators are required to ensure this data is reported accurately.
- *Column 6 Number of Sellers*: The enumerator records the number of traders selling a particular item at the market in column 1.

Table 3.5: MoAFS Retail Market Survey Form

IDENTIFICATION		**Checked**	
ADD		**By**	
MARKET		**Supervisor**	
DISTRICT		**Office**	
ENUMERATOR		**Date**	
		Initials	

Commodity Name[1]	Trial [2]	Measuring Unit			Wt	Price Kg		No. of Sellers	Type of Seller*	Source	Remarks
		Local[3]	Price[4]	No.[5]	Kg[6]	K	T[7]				
Maize	8 - 9 AM										
	11 – 12										
	3 - 4 PM										
	Average										
Rice	8 - 9 AM										
	11 – 12										
	3 - 4 PM										
	Average										
Cassava	8 - 9 AM										
	11 – 12										
	3-4 PM										
	Average										
Groundnuts	8 - 9 AM										
	11 – 12										
	3-4 PM										
	Average										
Beans	8 - 9 AM										
	11 – 12										
	3-4 PM										
	Average										
Millet	8 - 9 AM										
	11 – 12										
	3-4 PM										

Source: (Government of Malawi, 2003)

[1] **Commodity Name**: Commodity being measured.

[2] **Trial**: Different times during which the commodity is measured

[3] **Measuring Unit Local**: The unit of measure used by sellers or buyers in the market e.g. plate, heap, bundles etc.

[4] **Measuring Unit Price**: The price per local measuring unit.

[5] **Measuring Unit Number**: The number of times it takes the local measuring unit to fill the standard measure (10 litre bucket)

[6] **Weight in Kg:** The weight of the commodity which fills a standard measure (10 litre bucket)

[7] **Price/Kg:** The price per kg of the commodity (Local Measuring Unit-Price x Local Measuring Unit – Number)/Weight in kg e.g. Maize Grain cost MK10 per plate, 15 plates fill 10 litre bucket, total weight for 15 plates is 25 kg, therefore price per kg of maize grain = (MK10x15 plates)/25 kg = K6

- C*olumn 7 Type of Seller:* The enumerator records the type of seller in terms of whether the seller is an intermediary or farmer.
- C*olumn 8 Source*: The enumerator records the source of the commodity being sold at the market. The source could be across the border or any district within Malawi. The information helps in tracing the origin of the commodities being sold.
- *Column 9 Remarks:* The enumerator records any relevant observations that could be on availability, quality and demand of the commodity in the market.

3.6.2 Crop Estimates Methodology

The current methodology for making crop production estimates in Malawi was originally designed in connection with an FAO Early Warning System project in the early 1990s. The methodology was tested in Blantyre, Salima, Kasungu and Mzuzu Agricultural Development Divisions (ADDs) and was deemed after these trials to be successful at providing reliable and timely crop area, output and yield estimates. It was therefore adopted for national use in the crop year 1992/93. Since then the technical manual describing the procedure has been revised several times, the latest version being the 2007 Field Crops Production Estimation Methodology Manual (Government of Malawi, 2007b). The overseeing body for the estimation process within the Ministry of Agriculture and Food Security is the National Agricultural Production Estimates Committee (NAPEC), which meets at least three times each year. The collection process has been supported over the years by several aid donors, including USAID, FAO, the EU and the World Bank.

Excluding an extra stage for so-called ‘winter crops’, the crop estimate method involves three rounds of data collection conducted in November, March and May each year (Government of Malawi, 2005b). The first round collects data on land preparation, and stated plans by farmers for the planting season just started. The second round confirms actual area planted, inspects the condition of the established crop and estimates the yield and production. The third round confirms yields by weighing the harvest.

The methodology involves dividing field crops into major and minor crops. Major crops are defined as those crops occupying more than 5 per cent of cultivated area, while minor crops are those that occupy less than 5 per cent of cultivated area. This differentiation is disaggregated to ADD, district, section and block level so that the varying relative importance of different crops is picked up at the smallest area unit of agricultural sector administration. Before the commencement of the survey, separate lists of major and minor crops are prepared at each of these sub-levels. The procedural difference between minor and major crops lies in the sampling frame for the survey. For the major crops, the sampling frame involves selecting 25 per cent of blocks growing major crops. This is followed by selection of 20 per cent of individual farm households from the selected blocks in an Extension Planning Area (EPA). This selection process gives rise to an overall sample selection of 5 per cent of farmers who grow major crops in a selected EPA. For minor crops, the selection involves 25 per cent of agricultural blocks growing minor crops and all households in the selected blocks growing the minor crops, resulting in 25 per cent of households growing minor crops in an EPA being sampled.

The first round of this procedure involves listing and selection of agricultural blocks, listing of the households in each of the selected blocks, selection of the sample agricultural households, and area measurement of the crops grown by the sampled households in the selected blocks. The results obtained are used to determine the estimated area for each crop in the Extension Planning Area (EPA), the District, and the ADD. Also during this round, initial estimates are made of crop yield relative to the previous season. The area and provisional yield estimates are combined to make a first forecast of production by crop. The results are presented to the first Agricultural Production Forecast meeting held by NAPEC towards the end of January or early February each year.

The second round of the procedure involves the verification of, and adjustments to, the area measurement of crops grown by the sampled agricultural households, and results obtained are used to determine adjusted EPA, District and ADD crop cultivation areas.

New survey estimates of yield and production are also prepared at this stage for both summer and winter crops. The updated survey results are presented at the Second Agricultural Production Forecast meeting held each year by NAPEC usually towards end March or early April each year.

The third round of the survey is undertaken at harvesting time during May or early June. The main activity during this round is weighing the harvest obtained by sample farmers in order to obtain the actual yield that was achieved. The results are used to provide revised production figures at EPA, District and ADD levels, and they are presented at the third Agricultural Production Forecast meeting held by NAPEC by mid-June every year. An additional, fourth, round of the survey is undertaken to weigh winter crops and late maturing summer crops. This is usually done in August and the results are presented to NAPEC in mid-September each year. The procedure just described covers the smallholder or customary sector only. Production estimates from agricultural estates are collected separately, from the estates themselves, and do not involve the same elaborate sample selection methodology.

The undertaking of the production estimates survey involves a considerable number of Ministry of Agriculture field staff in every phase. The Evaluation Officer in each ADD is responsible for providing randomly selected blocks to Agricultural Extension Development Coordinators (AEDCs), and these blocks are supposed to change each year in order to avoid repetition of selecting same blocks. A calendar of survey activities for each round is given to the field staff involved. In addition, a set of Forms and Tabulation Sheets prepared to facilitate the collection of data are also given, including who is responsible for completing the forms, as set out in Table 3.6 below.

Agricultural Extension Development Officer (AEDOs), AEDCs and DADOs submit completed and signed survey forms and tabulation sheets to their Supervisors according to the Survey Calendar that starts in September each year and ends in May the following year. DADOs are expected to ensure that AEDCs and AEDOs have sufficient copies of the relevant Forms and Tabulation Sheets to enable them carry out the survey in their selected blocks. This brief description of the methodology demonstrates that AEDOs are the key staff in the production of crop estimates figures. The Monitoring and Evaluation officer at the ADD level is the initiator of the crop estimates survey by providing the list of sampled blocks each year to the AEDC who in turn passes those to the AEDOs to start the crop estimates work at the block level. However though the AEDO plays such an important role in crop estimates about 40 per cent of the vacancies are not filled (Government of Malawi, 2007a).

While every effort seems to have been made in the design of this methodology to produce as accurate crop production estimates as possible, it is legitimate to consider at what levels biases in estimates might creep in, since, as noted earlier, disquiet has been expressed by various observers concerning production estimates in the 2007-09 period (e.g. Jayne and Tschirley, 2009). Evidently, inaccuracies may occur if there are insufficient trained field staffs, or a shortage of the relevant survey materials, at the

Table 3.6: List of Forms and Tabulation Sheets to be Completed by ADD Officers in Each Forecast/Estimate

Officer Responsible	**Form or Table**	**Crop Forecast/Estimates**		
		First	**Second**	**Third**
Agricultural Extension Development Officer (AEDO)	Form B*	Yes	No	No
	Form 1	Yes	Yes	No
	Form 2	Yes	No	No
	Form 3	No	Yes	No
	Form 4	No	No	Yes
	Tabulation Sheet 1	Yes	Yes	No
Agricultural Extension Development Coordinator (AEDC)	Form A	Yes	No	No
	Tabulation Sheet 2	Yes	Yes	Yes
	Tabulation Sheet 3	Yes	Yes	Yes
District Agricultural Development Officer (DADO)	Tabulation Sheet 4	Yes	Yes	Yes

Yes = to be completed
No = Not to be used
* The AEDC works with form B once the AEDO has completed the listing of households
Source: (Government of Malawi, 2007b)

block, section and EPA levels. However, this does not mean that such inaccuracies would necessarily be biased in any particular direction. More dangerous (from an accuracy point of view) is if the process becomes overtly politicised with a general sentiment permeating from the top downwards that higher rather than lower estimates are preferable, wherever judgements (rather than measurements) are being exercised. Thus first round area and yield data (which depend in part on comparisons with the previous year) could be biased upwards at this point, and a tendency to select higher productivity rather than lower productivity blocks could creep in rather than strictly following the random selection procedure. While this type of bias should be overturned when harvests come in and the output of sample farmers is weighed, nevertheless if first and second round surveys have provided a national figure that has gained currency in public discussion there may be a rather overwhelming impetus for the figure not to be contradicted too much when the third round estimate is published. These thoughts are conjectural, and this researcher is not aware of any work that has set out to examine the constituent elements of recent production figures in detail.

3.6.3 Food Balance Sheet

The Malawi food balance sheet published annually provides data on energy foods available for consumption, and estimates the overall food shortage or surplus for each year in kilocalories. On the availability side of the balance are the estimated total quantities of energy foods produced, plus imports and releases from stocks, minus purchases into stock, exports, and deductions to livestock feed, seed, industrial and non-food use, and wastage. The food balance sheet represents the food available for consumption, or food per capita availability in terms of nutrient value (FAO, 2001; Government of Malawi, 2005b). On the consumption side, the balance sheet states energy food needs calculated from standardised per capita needs and changing demographic data. Ideally, all of Malawi's six food groups (staples, animal products, legumes, vegetables, fruits, fats and oils) should be included in the food balance sheet calculation, but data limitations confine it to calculation of the gap in energy foods only (Government of Malawi, 2005b). Energy foods refer to staple foods and include cereals (maize, sorghum, rice, wheat) and root and tuber crops (sweet and Irish potatoes, and cassava), and these are all converted to maize equivalent. Below is a description of how the food balance sheet is compiled in chronological order:

A. Calculates net food production by subtracting post harvest losses from gross production.

B. Calculates official opening stock by adding the following stocks: on farm, Strategic Grain Reserves (SGR) physical stocks in silos, ADMARC, and World Food Program (WFP) humanitarian stocks.

C. Calculates domestic availability by adding food production and official opening stock (A+B) above.

D. Calculates Kilocalories per kg to be derived from C.

E. Calculates domestic requirements by adding food use, seed requirements, and SGR replenishment.

F. Calculates domestic food balance by subtracting domestic requirement from domestic availability (C-E).

G. Makes provision for cross substitution with other foods.

H. Calculates shortfall/surplus for the year by adding domestic food balance and cross substitution (F+G).

I. Determines total imports to meet the shortfall if any and these imports are broken down into commercial imports (official and informal), food aid in the form of confirmed pledges and those received already.

J. Calculates committed exports broken down into actual exports (formal and informal) not yet exported.

K. Calculates actual net imports by subtracting total imports from committed exports.

L. Calculates actual food gap by subtracting net imports from shortfall (H-K).

The food balance sheet therefore measures the domestic shortfall or surplus from own production, and the import requirement in case of a gap, or the potential to export in the event of a surplus. The data used for own food production comes from the annual crop estimates discussed in the previous sub-section. The NAPEC, which discusses and approves crop estimates also discusses and approves the Food Balance Sheet figures. An example food balance sheet model calculation is presented in Table 3.7. The example is based on the Malawi Food Balance Sheet as at 31 March 2005. The food balance sheet for Malawi is routinely submitted to the Southern Africa Development Community (SADC) Regional Early Warning System for food security.

In the event of a looming food crisis, a Joint Assessment Mission composed of the FAO, World Food Program (WFP) and the Government of Malawi is formed. The mission generates additional information that is used to compare with the crop estimates produced by the government through the normal crop estimates procedure described in section 3.6.2 above. When the food balance sheet compiled by government differs from

Table 3.7: Malawi Food Balance Sheet, as at 31st March 2005
(all data in '000 tons)

Item	Maize	Rice	Sorghum /Millet	Cassava	Maize Equiv.
A. NET PRODUCTION (A1-A2)	**1,473.2**	**30.8**	**52.4**	**691.0**	**2,192.0**
A1. Gross production	1,733.1	49.7	58.3	767.8	2,546.7
A2. Post-harvest losses	0.0	0.0	0.0	0.0	0.0
B. OFFICIAL OPENING STOCKS (B1+B2+B3+B4)	**29.1**	**0.0**	**0.0**	**0.0**	**29.1**
B1. On-farm stocks	0.0	0.0	0.0	0.0	0.0
B2. SGR (physical stocks in silos)	7.0	0.0	0.0	0.0	7.0
B3. ADMARC	0.0	0.0	0.0	0.0	0.0
B4. WFP (humanitarian aid)	22.1	0.0	0.0	0.0	22.1
C. DOMESTIC AVAILABILITY (A+B)	**1,502.3**	**30.8**	**52.4**	**691.0**	**2,221.1**
D. KILOCALORIES/KG	**3.5**	**3.3**	**3.4**	**3.2**	**0.0**
E. GROSS DOMESTIC REQUIREMENTS (E1+E2+E3)	**2,030.1**	**97.2**	**53.9**	**313.6**	**2,466.6**
E1. Food Use	1,930.9	93.4	53.4	313.6	2,363.2
E2. Seed Requirement	39.2	3.8	0.5	0.0	43.4
E3. SGR Replenishment	60.0	0.0	0.0	0.0	60.0
F. DOMESTIC FOOD BALANCE (C-E)	**-527.8**	**-66.4**	**-1.4**	**377.4**	**-245.5**
G. CROSS SUBSTITUTION	**282.3**	**-64.1**	**-1.4**	**347.8**	**0.0**
H. SHORTFALL/SURPLUS (F+G)	**-245.5**	**0.0**	**0.0**	**0.0**	**-245.5**
I. TOTAL IMPORTS	**120.2**	**2.6**	**0.5**	**1.6**	**124.6**
I1. Commercial Imports	**111.8**	**2.5**	**0.3**	**1.6**	**116.0**
I1-1. Imports Received: Official	35.6	0.0	0.0	0.0	35.6
I1-2. Imports Received: Informal	76.2	2.5	0.3	1.6	80.4
I2. Food Aid (Confirmed Pledges)	**8.4**	**0.0**	**0.2**	**0.0**	**8.6**
I2-1. Prog/Emergency Food Aid Received (31/03/05)	8.4	0.0	0.2	0.0	8.6
L. COMMITTED EXPORTS (as of 1/04/04) (L1+L2+L3)	**0.7**	**0.7**	**0.0**	**0.0**	**1.4**
L1. Actual Exports	0.0	0.0	0.0	0.0	0.0
L2. Not Yet Exported	0.0	0.0	0.0	0.0	0.0
L3. Actual Exports(Informal) (31/03/05)	0.7	0.7	0.0	0.0	1.4
M. ACTUAL NET IMPORTS (I-L)	**119.5**	**1.9**	**0.5**	**1.6**	**123.2**
N. PROJECTED NET IMPORTS	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
O. TOTAL FOOD GAP (MAIZE) (Mar 05)	**-245.5**	**0.0**	**0.0**	**0.0**	**-245.5**
P. ACTUAL FOOD GAP (31/03/05)	**-126.0**	**1.9**	**0.5**	**1.6**	**-122.3**

Source: (Government of Malawi, 2005b)

the FAO/WFP, the latter's figures tend to be used. The FAO is the institution that has been assisting Malawi with food balance sheet calculation expertise for years.

Any food balance sheet, and Malawi's is no exception to this rule, is a provisional statement based on the accuracy of its constituent underlying components. On the production side, certain caveats regarding the potential for inaccuracy to arise in production estimates have already been mentioned in the preceding section. Estimates of the share of output that is used in food industries depend on a national food survey that is undertaken rather intermittently, depending on donor funding. Estimates of informal imports that occur through unregulated border trade are rough and ready in any year (by definition these imports are not accurately measured by customs control procedures), and estimated variations that occur from year to year may differ considerably from the true volumes of cross-border trade that occur. On the consumption side, figures for the population and demographic structure are revised at the decennial population census, but the accuracy of even this exercise is sometimes disputed depending on the conduct and resourcing of the census itself. Intercensal population data is projected, and may after seven or eight years from the previous census become increasingly unrepresentative of underlying trends. Also on the consumption side, changes in relative prices affect consumption between different foods, and this is so the bigger the changes in relative prices that occur. The food balance sheet is not an econometric model of food demand, and therefore does not incorporate substitutions in consumption that may occur with changing prices.

3.7 Additional Methodological Aspects of the Research

It was mentioned at the beginning of this chapter that an approach that combines quantitative fact finding with recognition that both the generation of 'facts' and their interpretation are located in historical, social and political contexts is called by some authors 'analytic narrative'. Much of this thesis does not especially require an appeal to analytic narrative, in that findings are reported from methods and analytical techniques that are reasonably free standing on their own terms. However, Chapter 6 of the thesis, in particular, has a form and mode of argumentation that fits the methodological position described as analytic narrative, and for this reason a brief summary of this approach is provided here. In addition, Chapter 5 contains a section that explores spatial integration between markets for maize in Malawi using an econometric technique called cointegration, so this method is also briefly described here. Finally, this section of the chapter describes instances of difficulties encountered in fieldwork, especially in the understanding of respondents regarding the purpose of the research, which need to be mentioned because they affect the quality of data obtained from the fieldwork component of the research.

3.7.1 Analytic Narrative

The approach to enquiry called analytic narrative is associated particularly with the political scientist Robert Bates who has already been mentioned in Chapter 2 in relation to the politics of staple food markets, and is well known in African studies for his early work on the political analysis of marketing boards (Bates, 1981a). Bates and others have sought to overcome the difficulty of deriving substantive findings from situations where politics and history result in different outcomes from the projections and estimations that might be deduced from the economic analysis of a policy problem, or sequence of events or trends (Bates *et al.,* 1998; 2000). The approach is called narrative because it combines analytical tools that are commonly employed in economics and political science with the narrative form, which is more commonly employed in history. It therefore explores concrete, historical cases, and examines the choices made by government, and traces the sequences of actions, decisions, and responses that generate events and eventual outcomes.

In this thesis, the analytic narrative approach is deployed in particular in Chapter 6 to examine recurrent food price crises in Malawi in the 2000s, and the interplay of politics and economics that resulted in specific outcomes with respect to those crises. When prices begin to rise, certain political responses begin to form, and these can be traced especially through press releases and media stories as the events unfold. Statements about causality are made (for example, that private traders are hoarding grain), decisions are taken in a certain sequence (for example, banning imports, setting maximum retail prices, building up or running down public stocks), these decisions are provided with a logic in the public domain and may cause debate between political parties vying to establish themselves as championing the cause of particular segments of the electorate. The sequence of events has a cumulative momentum that may result in extreme measures that have little to do with the underlying economic factors that policy is supposedly attempting to address.

Analytic narrative may be strongly informed by theory, or seek to verify a theoretical construct, or may be problem driven in the sense of being primarily motivated by a desire to account for particular events or outcomes. The analytical part of the term corresponds to a theoretical line of reasoning; for example, in the Malawi maize market case, certain deductions about markets and prices and trends can be made using microeconomic models of varying complexity, and these might reach conclusions for appropriate policy action that are distinct from the messy, contextual, politicised sequence of decision making that actually occurs. Nevertheless, these two (or more) dimensions interact with each other in the production of outcomes. The analytic narrative approach seeks to understand decision makers preferences, their perceptions, evaluation of alternatives, the information they possess, the expectation they form, the strategies they adopt, and the constraints that limit their actions. If through the narrative, a representation of the problem is achieved that seems to do better at explaining outcomes than other methods, then the approach is justified; and, moreover, in some instances may lead to better theory as well as better explanation.

3.7.2 Investigating Spatial Market Integration Using Cointegration

As a way of strengthening the empirical analysis, it was decided to explore the spatial relationship between prices in different markets using time series econometrics. Spatial market integration occurs when markets work sufficiently well to move stocks from places in surplus (with low relative prices) to places in deficit (with high relative prices), until prices equalise taking transport costs into account. This process of trading across space to take advantage of price differentials is called spatial arbitrage.

There are different methods, varying in statistical complexity, for examining spatial market integration (see Trotter, 1992 for a discussion). One common method that is very accessible is to examine correlations of time-series price statistics between pairs of markets, showing the extent to which prices in different markets seem to track each other. The simple correlation method has several weaknesses, including inability to demonstrate the direction of price changes, and the possibility of capturing spurious correlations if the prices are non-stationary series.[24] If time series variables are non-stationary simple regression may provide highly significant coefficients even though the relationship is spurious. If a linear combination of two non-stationary series provides a

[24] Time-series data are non-stationary if the mean and variance of the data varies. Most economic time-series like GDP figures and prices are non-stationary since generally they increase stochastically with time.

stationary series, the two variables are said to be cointegrated. If so, the cointegrating equation between the two captures long-term equilibrium.

While the cointegrating equation captures the long-term relationship, the short-term dynamic is captured by the error correction model. Even though the two variables (in our case, maize prices in different markets) may be in long term equilibrium, they may deviate from the equilibrium level in the short run which is captured by the error correction model (for details see Johansen, 1995; Stata Corp, 2009).

Here the nature of the cointegration equations and error correction models empirically to be implemented in Chapter 5 (Section 5.3) is outlined. Let P_{jt} be the price of maize in market j at time period t. Then the cointegrating equation between the price in market j and k is:

$$\_ce = P_{jt} + \beta P_{kt} \tag{1}$$

Here, $\_ce$ is the error term in the cointegrating equation representing the deviation from long-term equilibrium and β is the cointegrating coefficient (vector) which represents by how much prices in market k change for a unit price change in market j in the long-run. If the market is in long-run equilibrium, then $\_ce = 0$; otherwise, $\_ce \neq 0$ and an 'error correction' should be made to eliminate this short-term equilibrium. This is represented, as indicated above, by the error correction model which in this case will appear as follows (for simplicity these describe only one lag period and two price series):

$$dP_{jt} = \alpha\_ce + \gamma LdP_{jt} + \delta LdP_{kt} \tag{2a}$$

$$dP_{kt} = \pi\_ce + \lambda LdP_{kt} + \theta LdP_{jt} \tag{2b}$$

Where d and L are the difference and lag operators and $\alpha, \gamma, \delta, \pi, \lambda$ and θ are parameters to be estimated. The above two error correction models estimate the price changes as functions of lagged own and other prices and deviation from long term equilibrium. If the two markets are out of long-term equilibrium $\_ce$ will be different from zero, and, correspondingly, α and π indicate how much the two prices will change to correct this. How much current price changes are affected by previous month's price changes in the same market is captured by γ and λ. Similarly, how much current price changes are affected by previous month's price changes of the other market is captured by the parameters δ and θ.

In Section 5.3 the cointegration equations and error correction models for markets that are found in the north, centre and south of Malawi are estimated by using monthly maize price data for 13 markets from 1989 to 2009.

3.7.3 Challenges in the Fieldwork

The researcher and her enumerators confronted three main challenges in conducting fieldwork on the Malawi maize market, all of them related in one way or another to government maize policies, and to the sensitivity that surrounded the varying and unpredictable stance of government towards private traders and the regulation of the maize market in 2008. The three challenges were confusion in communities between the research and input subsidies; sudden changes in the agricultural trading regulatory environment; and reluctance of larger scale private operators to discuss price formation in 2008 due to the sensitivity of the topic as a public policy issue at that time.

The main exposure to government and administrators that farmers and villagers had encountered during the four years preceding the research was the Agricultural Input Support Programme (AISP). In Mission village the community thought the team had arrived to register beneficiaries of the inputs program in readiness for the next season, and for that reason community members asked for their names to be put on the list, as also the names of their friends and neighbours who were not around. This may have distorted upwards the household population from which sample households were drawn in Mission village. In Chinteka village, some households had been left out of the 2007/8 AISP but were selected to take part in the research, and this inadvertently caused bad feeling between interviewees and enumerators until the non-connection of these events was properly established.

The timing of the fieldwork, May to August 2008, was a period that experienced much government interference in the maize market in the form of rapidly changing prohibitions and regulations (see Chapter 6). The first of these was the imposition of an import and export ban on maize in May 2008, just a week before the research commenced. The research started at Mission Village adjacent to an area well known for informal cross-border trade with Mozambique. Many traders thought the research team had come to enforce the import ban, and for this reason chose not to identify themselves to the team (and therefore could not be included in the follow-the-bag sequence, or in other trader interviews). Similar difficulties were experienced at other sites as new government regulations, such as minimum buying prices, came into effect. In most cases, these difficulties got resolved through patience and persistence; however, they undoubtedly affected the overall willingness of traders to answer honestly to questions, given that severe penalties were promised by the government on anyone caught breaking the evolving new rules.

Broadly, similar considerations affected interviews or attempted interviews with larger traders and processors, and with ADMARC. The rapidly changing regulations, and an atmosphere of distrust towards the private sector, meant that discussions with key informants tended to be guarded and lacking in explicit operational detail. This problem was doubtless not helped by the researcher's own position as a senior official in an agricultural marketing related role,[25] of which many prospective interviewees were aware. This did not prevent useful interviews from taking place, but it did inhibit the range and frankness of discussion. The extent of upheaval in this period was unusual even by Malawi standards of frequent changes in import, export and minimum buying price policies, and could not have been envisaged when the research was planned. It needed to be worked around in a lot of the key informant interviews conducted.

3.8 Summary

This chapter has set out the range of methodological considerations that were involved in structuring the research underlying this thesis, and that were also important in deriving findings, and interpreting those findings. The main methods comprise a toolbox of descriptive statistical techniques useful for analysing seasonal price behaviour in crop markets (deployed in Chapter 4) and qualitative and quantitative fieldwork methods used for data collection in Malawi villages (with results reported in Chapter 5). These methods are set loosely in a broader methodological approach sometimes referred to as 'analytic narrative' that seeks to combine quantitative data with knowledge of the historical, social and political context that both generates the data and lends force to particular interpretations of quantitative findings. Chapter 6 in particular relies on this approach since it brings together known 'facts' about the functioning of the Malawi maize market in the 2000s with an interpretation of how history and politics affected that functioning over time. Finally, the chapter also

[25] The researcher works for the IDEAA and MACE projects which are co-financed by MOAFS.

identified and described other pertinent methods that are relevant to the research and analysis, and these include Malawi government methods for collecting data sets used in the thesis, and the econometric method of cointegration, which is used to examine spatial market integration in one of the sections of Chapter 5.

Chapter 4 : Price Seasonality in Maize and Other Food Crops in Malawi

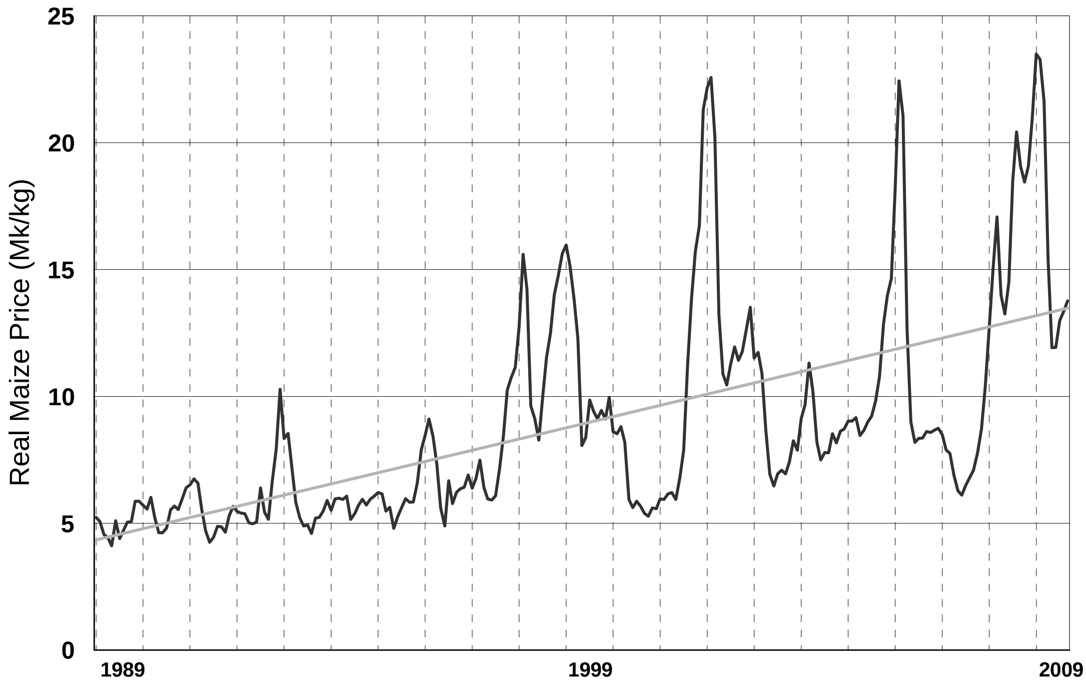
4.1.Introduction

This is the main thesis chapter reporting the analysis of, and findings about, price seasonality in food markets in Malawi, with a central emphasis on seasonality in the maize market. It is recalled from earlier chapters that price seasonality is not a trivial issue in a country with a poverty rate over 50 per cent, and where a single staple grain dominates the food consumption of the poor. While there may be debates about how best to deal with food price seasonality, there is no debate at all about the devastating consequences of excessive price instability for food insecure poor people. It is the social and distributional consequences of food price instability that in the end form the strongest reasons for devising policies that can keep such instability within tolerable bounds, consistent with accomplishing the marketing function of inter-temporal storage between harvests.

The analysis presented here in the main covers a 21-year period from 1989 to 2009. As described in Chapter 2 above, maize and other crop markets in Malawi were liberalized in 1987, at least to the extent that the monopoly powers of ADMARC were removed, and a legislative framework created for the licensing of private traders. While enthusiasm for private trading has ebbed and flowed in subsequent policy actions by government, there have been significant periods during which the regulatory environment for private trade was relaxed in favour of traders, and actions were taken to make maize market management more of a partnership between private trade and government than solely a government role. Interspersed within this broad trajectory allowing the private sector to expand and strengthen, there have been intermittent government decisions that have worked in the opposite direction, even to the extent of banning private traders from operating in the maize market altogether as occurred for a time between 2008 and 2009.

Thus the time period covered here occurs wholly in the post-liberalization phase of Malawi food market history. It might be expected that an expanding private sector at all the different stages and scales found in liberalised crop markets would result in seasonal price changes gravitating towards a temporal price margin that would just cover the costs of inter-temporal storage, consistent with a competitive market environment in which no single trader would be able to manipulate market circumstances in their individual favour (for example, by keeping stock off the market in order to force prices upwards). The analysis provided here and in Chapter 5 may provide useful pointers as to whether this has in fact been occurring. In the meantime, what we so far have is the seasonal pattern of maize prices as shown for the 2000s in Figure 1.1 in Chapter 1. In Figure 4.1 below, this same pattern is extended backwards to 1989, so that the whole period under investigation can be seen.

Figure 4.1: Trend in Real Maize Prices 1989-2009
(nominal prices deflated by CPI base-year 2000=100)



Note: the linear trend is fitted using ordinary least squares
Source: MoAFS monthly maize price data, average for all Malawi

Figure 4.1 needs to be interpreted with caution. This is because price spikes associated with 'shocks', i.e. major weather-induced shortfalls in production, should not be confused with routine seasonal instability in a 'normal' production year. Seasonality is primarily shown with annual price peaks coinciding with the vertical dashed lines, which are drawn at January of each year. January or February are the two months in the lean season when prices are at their seasonal highest, before prices begin to decline in anticipation of the next harvest, occurring mainly in May and June. It is rare for any year not to show a seasonal peak, although this peak can be muted following an exceptionally good harvest; as occurred for example in 2006/07, following an excellent harvest in 2005/06. When prices barely descend at harvest time as occurred in mid-2008, then it is likely that a poor harvest is responsible, and in the 2008 instance the magnitude and direction of price changes are at odds with official production figures (Jayne and Tschirley, 2009).

Superimposed on the monthly real price pattern shown in Figure 4.1 is a linear trend, fitted using ordinary least squares. This trend is statistically significant, the null hypothesis of no trend is rejected at the 99 per cent confidence level.[26] The linear trend confirms what is visually apparent in the raw data, that real maize prices have been rising over the twenty years 1989-2009. Overall, the graph conveys an impression of rising real prices and increasing price instability over time. The occurrence of rising real maize prices in Malawi has been recognized by other researchers, including the emergence of seasonal price spikes that go significantly above import parity (Tschirley and Jayne, 2008; Jayne and Tschirley 2009,). The task of this chapter is to affirm the accuracy or not of these first impressions, and to consider factors that might modify or help to interpret the findings that are derived.

The procedure for analyzing price instability in crop markets has been described in Chapter 3 above (Section 3.2). A significant feature of this procedure is to isolate the 'pure' seasonality effect in time-series price data by removing cyclical, trend and random effects. Since one of the trend effects that is removed by the procedure is inflation, the analysis is conducted using nominal price data. This avoids non-trivial issues concerning whether official rates of inflation represent true price changes in the economy, and what the appropriate deflator (in terms of components of the CPI) should be to deflate the price series of a single food commodity. The question might be asked why an econometric method is not used here in preference to the descriptive statistical technique that is applied. The answer to this is choice of the appropriate method for the purposes to which it is to be put. As is well known price time-series are beset with autocorrelation problems, and the econometric methods used to overcome these problems (distributed lags; first- and second-order differences etc.) take us a long way from what we wish to demonstrate in this chapter which are the descriptive analytics of

[26] The trend coefficient is 0.037 and standard error 0.003, resulting in a t-value of 12.245. It is recognised that such a trend is provisional. The existence of autocorrelation in price time series means that descriptive statistics of this kind may not provide an accurate picture of the pattern of sequential change being observed.

seasonal price variations.[27] In the next chapter time-series econometrics in the form of cointegration analysis is used in a context where it is the appropriate tool for the purpose of the analysis, which is to examine the extent of spatial integration between markets for maize in Malawi.

The chapter proceeds as follows. Section 4.2 examines maize price seasonality on a national scale, describing the average seasonality that is found for the observation period as a whole, as well as any trends in the extent or 'depth' of seasonality that can be detected. Section 4.3 examines price seasonality in other food crops in Malawi to see whether the findings for maize are replicated across other crop markets or are peculiar to the maize market itself. It is recognized in doing this that there are many reasons that crops may differ in the degree of price seasonality that they exhibit; nevertheless, for any individual crop the direction of change in price seasonality is rather different from its absolute level, and comparing crops in this regard may yield useful insights into factors in the maize market that differ from other food crops. Section 4.4 extends the analysis of maize price seasonality to major district and rural markets spread across the country in order to gain a first indication of whether similar or different experiences of seasonal price instability occur in different parts of the country (this is followed up in Chapter 5 by the cointegration analysis already mentioned). Section 4.5 interprets the results of the preceding sections. It does this by reference to the findings of other researchers in three main areas: gross and net storage margins for maize; maize supply considerations that affect the degree of seasonal price instability experienced; and the influence of international maize prices on Malawi domestic price levels in the short and long term.

4.2.Seasonality in the National Maize Market

As described in Chapter 3, the national monthly maize price series in Malawi is derived from price data in markets across the country collected by the Agro-Economic Survey Unit of the Ministry of Agriculture and Food Security (MoAFS). This data has been collected and collated since 1988. It initially provided price information once a week from 32 markets, and nowadays provides price information weekly from 80 markets (Government of Malawi, 2003) with 72 markets used for calculation of monthly average prices. Consolidated prices are obtained using simple averages of the underlying data,

[27] The procedure used in this chapter has been utilized by many economists studying seasonality and is not considered any less valid for being relatively straightforward in statistical terms (see, for example, Sahn and Delgado, 1989)

and are not therefore corrected for relative volumes traded at different times or in different markets. It is recognised that this data is not perfect, and some price patterns may reflect changes over time in methods and coverage, rather than 'true' price trends. On the other hand, this is a 21-year period with 246 monthly data points, so most incidental events should turn up in the standard errors of price index variables.

The steps in the seasonal price analysis are described as follows (Table 4.1 refers):

(a) The procedure starts with the time-series nominal monthly price per kg of maize grain, from July 1989 to December 2009 (Table 4.1 only shows the prices for 1989-1991, for illustrative purposes, but the full price series is provided at Annex 1 to this chapter).

(b) A 12-month moving seasonal average (MSA) is applied to this data, using the formula set out in Chapter 3, such that each new data point represents a 12-month mean centred on an individual month. In terms of data points, this procedure means that six months are lost at the beginning and end of the period, reducing the data points from 246 to 240. The effect of this procedure is to isolate the seasonal component of price changes from trend and cyclical components, since each MSA is an entire season in length (again, Table 4.1 shows the MSA for 1989-1991 for illustrative purposes).

(c) The seasonal index (SI) is calculated by dividing each nominal monthly price by the MSA centred on the same month, multiplied by 100, thus converting nominal prices into an index representing the relative (percentage) degree to which each nominal price is above or below the MSA. For example, the SI for June 1990 is 84.4, meaning that the June price is 15.6 per cent below the 12-month average price centred on June 1990 (Table 4.1 again).

(d) In this procedure, arithmetically, the average seasonal index (SI) for any 12-month period should equal 100; however, it does not do so exactly due to the averaging procedure that enables a 12-month period to be centred on an individual month (see equation (3) in Section 3.2, Chapter 3). This means that a small arithmetical error occurs at this stage that needs to be corrected later in the analysis; however, the correction method for dealing with this error does not alter the degree of seasonality that results from the analysis (Trotter, 1992 p.10; and see below).

(e) The grand seasonal index (GSI) for a particular month (e.g. January) is obtained by taking the mean of all January SIs available (20 of them in this time series covering 1989 to 2009). In Table 4.1 the GSI for the entire data series is set out in the last two columns of the Table. In the unadjusted GSI column, each index number represents the mean of all the SIs available for that month in the entire series.

(f) The final aim of this procedure is to obtain a set of index numbers in which a 12-month set of data has a mean of 100, and each individual month's degree of seasonality is expressed as a percentage departure from this mean. Due to the small averaging errors that occur at the point of dividing nominal price data by the moving seasonal average, the initial 'raw' GSI data has to be corrected in order to satisfy the requirement that the sum of all GSIs should equal 1200 and their average should equal 100. Therefore a correction factor is applied to the raw GSI data, in which each GSI is multiplied by 1200 divided by the unadjusted sum (in this instance 1185.7, so that the correction factor is 1.012). Note that this correction does not alter the relative seasonality positioning of each month compared to other months, nor does it alter the percentage degree of seasonality represented by the index for the month being divided by the mean index for the year. All it does is multiply all GSIs by a constant thus leaving relative values exactly as they were.

(g) Table 4.1 shows both the unadjusted and adjusted GSI values for this analysis. On average over a 20-year period the month of March, say, has a seasonal price that is 12 per cent above the annual average; while July has a seasonal price that is 11.9 per cent below the annual average. Cyclical, trend, and random components are purged from the nominal price series in this procedure, and the GSIs represent as accurately as possible the pure seasonal effect.

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nominal price series in this procedure, and the GSIs represent as accurately as possible the pure seasonal effect.

Table 4.1: Grand Seasonal Index Computation
(showing only part of the full data series)

Year	**Month**	**Time**	**Maize Price MK/kg**	**MSA**	**SI**	**GSI *Unadjusted***	**GSI *Adjusted***
1989	Jul		0.27				
	Aug		0.29				
	Sep		0.31				
	Oct		0.31			Average	Average
	Nov		0.36			*All Years*	*All Years*
	Dec		0.36			1989-2009	1989-2009
1990	Jan	1	0.37	0.34	110.4	118.4	119.8
	Feb	2	0.36	0.34	105.5	123.0	124.5
	Mar	3	0.39	0.35	112.0	117.8	119.2
	Apr	4	0.35	0.36	98.6	96.6	97.8
	May	5	0.31	0.36	85.9	80.8	81.8
	Jun	6	0.31	0.37	84.4	77.0	77.9
	Jul	7	0.33	0.37	88.1	83.7	84.7
	Aug	8	0.38	0.38	99.1	85.0	86.0
	Sep	9	0.39	0.39	99.6	89.7	90.8
	Oct	10	0.39	0.40	98.2	95.6	96.7
	Nov	11	0.42	0.40	104.9	104.2	105.5
	Dec	12	0.45	0.40	112.0	113.7	115.0
1991	Jan	13	0.46	0.40	114.5	1185.7	1200.0
	Feb	14	0.48	0.40	119.8	Sum	Sum
	Mar	15	0.47	0.40	117.9	*Unadjusted*	*Adjusted*
	Apr	16	0.40	0.40	101.1		
	May	17	0.34	0.39	86.4		
	Jun	18	0.31	0.39	79.1		
	Jul	19	0.33	0.39	84.7		
	Aug	20	0.36	0.39	93.1		
	Sep	21	0.36	0.38	93.8		
	Oct	22	0.35	0.38	91.3		
	Nov	23	0.40	0.39	103.1		
	Dec	24	0.43	0.40	108.4		

Note: this table shows the raw data and its transformation into MSA and SI just for Jul 1989 to Dec 1991. For the complete monthly price data series to December 2009 see Appendix IIa,IIb. The final two columns show the monthly unadjusted and adjusted GSI for the entire time series. See text for an explanation of the procedure involved.

Source: monthly maize price data published by MoAFS, Government of Malawi

The adjusted GSIs tell us a considerable amount about the extent of seasonal price swings in the Malawi maize market. By reference to Table 4.1, the peak GSI occurs in February with an adjusted index value of 124.5, while the lowest GSI occurs in June with a value of 77.9. The difference between these indices is 46.6 index points. This seasonal gap can be interpreted as a gross storage margin, since it represents the difference between trough maize prices at harvest time and peak prices at the height of the following lean season. For this reason the gap is more appropriately expressed as a percentage increase above the lowest index level i.e. 46.6/77.9 which is 59.8 per cent. The first key finding of this analysis is, therefore, that over a 21-year period, the average gross seasonal margin for maize in Malawi has been 59.8 per cent. Much of the rest of this chapter is concerned with placing the size of this seasonal margin in context, and this includes discussion in Section 4.5 that relates the gross seasonal margin to storage costs.

The variation in GSIs for an individual month permits statistical analysis to verify whether the mean GSI can safely be regarded as significantly different from 100. In this analysis, a t-test value is calculated from the standard error and the estimated monthly means. The Ho is that the GSI index number is not significantly different from 100. A t-value greater in absolute terms than 2.09 indicates that the H1 of significant price seasonality in that month's price can be accepted with a 95 per cent degree of confidence. As shown in Table 4.2, April is the only month for which the GSI is not in statistical terms significantly different from 100. For the annual cycle as a whole, significant price seasonality is statistically verified.

The verification and pattern of price seasonality is given more precision by examining the width of the band represented by one standard error either side of the mean. This is tabulated in Table 4.3 and illustrated in Figure 4.2. The figure shows that one standard error in general represents a narrow band either side of the mean GSI, implying that annual variation in seasonal prices relative to annual means is quite small. The peak price season (Jan-Mar) exhibits a widening of this band, indicating more variation from year to year in the height of that peak. Overall, the data seems to suggest a reasonable degree of predictability in seasonal price changes, once cyclical and other factors have been stripped out of time series price movements.

Table 4.2: Statistical Incidence of Seasonality by Month 1989-2009

Month	GSI Unadjusted	SE Mean	T-test value
January	118.4	3.02	6.09
February	123.0	4.31	5.35
March	117.8	3.46	5.16
April	96.6	2.17	-1.54
May	80.8	1.92	-10.00
June	77.0	1.53	-15.02
July	83.7	2.23	-7.31
August	85.0	1.87	-8.02
September	89.7	1.67	-6.14
October	95.6	1.40	-3.14
November	104.2	1.56	2.72
December	113.7	2.76	4.95

Source: monthly maize price data published by MoAFS, Government of Malawi

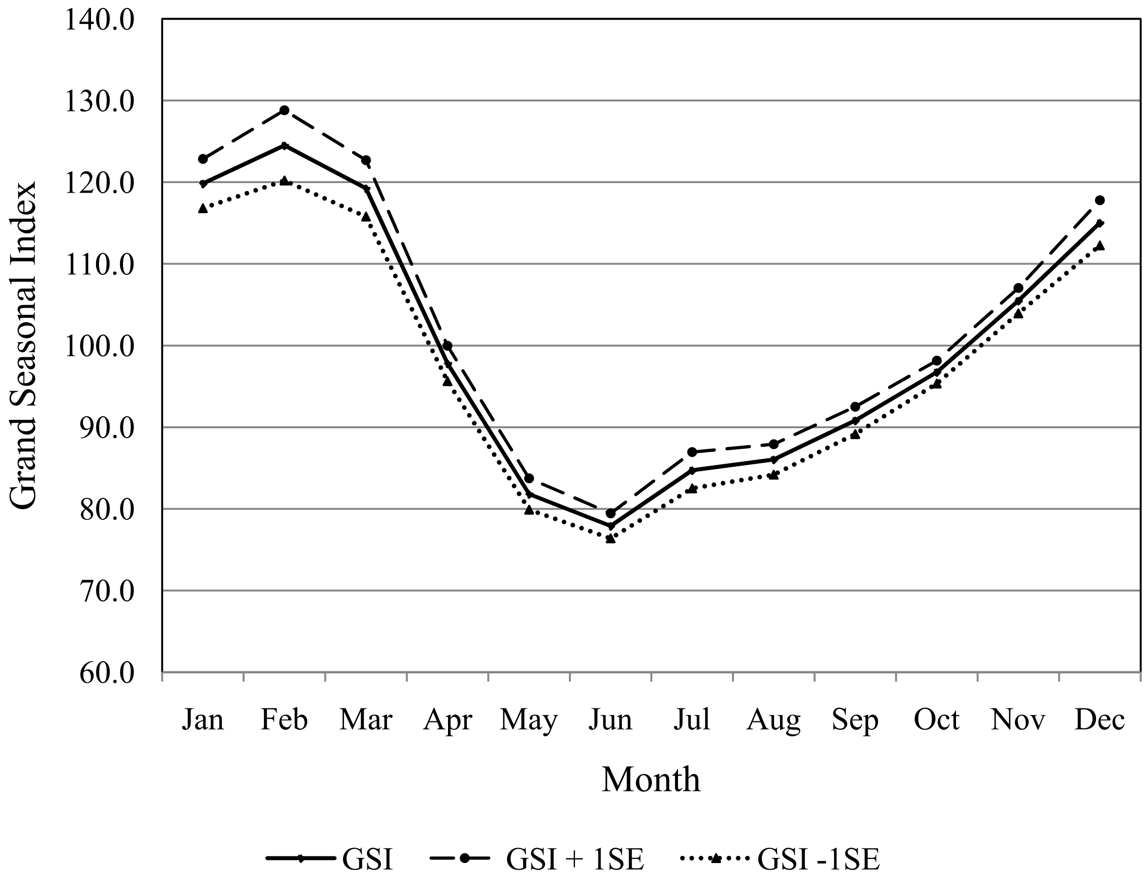
Table 4.3: Variation around GSI Values for Maize 1989-2009

Months	GSI Corrected	GSI + 1SE	GSI -1SE
January	119.8	122.9	116.8
February	124.5	128.8	120.2
March	119.2	122.7	115.8
April	97.8	100.0	95.6
May	81.8	83.7	79.9
June	77.9	79.4	76.4
July	84.7	87.0	82.5
August	86.0	87.9	84.2
September	90.8	92.5	89.2
October	96.7	98.1	95.3
November	105.5	107.0	103.9
December	115.0	117.8	112.3

Source: calculated from monthly maize price data published by MoAFS, Government of Malawi

The seasonal analysis also allows investigation of whether seasonal price spreads are increasing or narrowing over time. This is done here in two main ways. The first is to examine whether statistically significant trends can be detected in the GSI for the particular months that represent the peaks and troughs in the annual price cycle. If the trend coefficient for the peak price index is getting higher over time and/or the trend coefficient for the trough price index is declining over time, this implies a widening of the seasonal price margin and indicates that the 'problem' of price seasonality is growing rather than remaining stable or declining over the years.

Figure.4.2: Variation Around Maize Index Values 1989-2009



Source: data contained in Table 4.3

The data contained in Table 4.4 display the results of applying a simple linear trend to the GSI values across 21 years 1989-2009 for the two peak and two trough months. The H0 in this instance is the absence of a statistically significant trend. A t-test value above ±2.09 would indicate rejection of the H0 at a 95 per cent level of confidence (Walsh, 1990). None of the selected months shows a statistically verified trend in GSI levels over this period, therefore the null hypothesis of no significant trend in these index values is accepted. The same is true if the difference between the peak month (Feb) and the trough month (June) is examined for the presence of a trend: the trend coefficient is 0.88, SE 1.05 and t 0.84, so the null hypothesis of no trend is accepted.

Table 4.4: Trend Analysis of Maize GSI for Peak and Trough Months, 1989-2009

Months	Mean GSI	Trend coeff.	SE (coeff.)	t (coeff.)
January Peak	119.8	0.55	1.05	1.05
February Peak	124.5	0.70	0.75	0.93
June Trough	77.9	-0.27	0.29	-0.94
July Trough	84.7	-0.36	0.41	-0.88

Source: calculated from monthly maize price data published by MoAFS, Government of Malawi

A second method for assessing whether seasonal price spreads are increasing or narrowing over time is to divide the 21-year period of the price time series into two sub-periods and examine whether GSI levels differ from each other for these sub-periods, and in what direction, for the critical months. The period is divided into 1989 to 1999, and 1999 to 2009, with each period comprising an equal period of 10.5 years for ease of comparison. It is possible to have year 1999 appear in both periods because each period loses a half year in the computation, so that 1989-1999 loses the half year from January to June 1999 at the end of the period, while 1999 to 2009 loses July to December at the beginning of the period. These periods are not chosen for any reason related to changes in the policy environment that may have occurred between them. They are merely a division of the overall observation period into two equal time periods, and offer an alternative representation of change, if it is occurring, to the preceding examination of trends. Equally, the period could be sub-divided into three or four sub-periods, however the GSI values then obtained would contain fewer observations, compromising their statistical accuracy.

The results of this exercise are summarized in Table 4.5 and graphed in Figures 4.3 and 4.4. The peak GSI values are higher in the second period than the first, while the trough GSI values are lower between the two periods. This causes the overall gap between highest and lowest GSI values to rise from 43.5 to 49.8, which in turn means that the gross seasonal margin grows from 54.9 per cent to 65 per cent. An additional feature that is brought out in Figure 4.3 is the apparent tendency for the price decline at harvest to occur earlier and more steeply in the later rather than earlier period. Finally, Figure 4.4 reveals distinctions in the patterns and variability of seasonality between the two periods. The first period exhibits much greater annual variability around mean GSI values than the second period. It also reveals a curious elongation of the trough price season (spread over three months) compared to the sharper and more decisive turnaround of the later period (spread over two months).

Table 4.5: Maize GSI for Sub-Periods 1989-99 and 1999-09

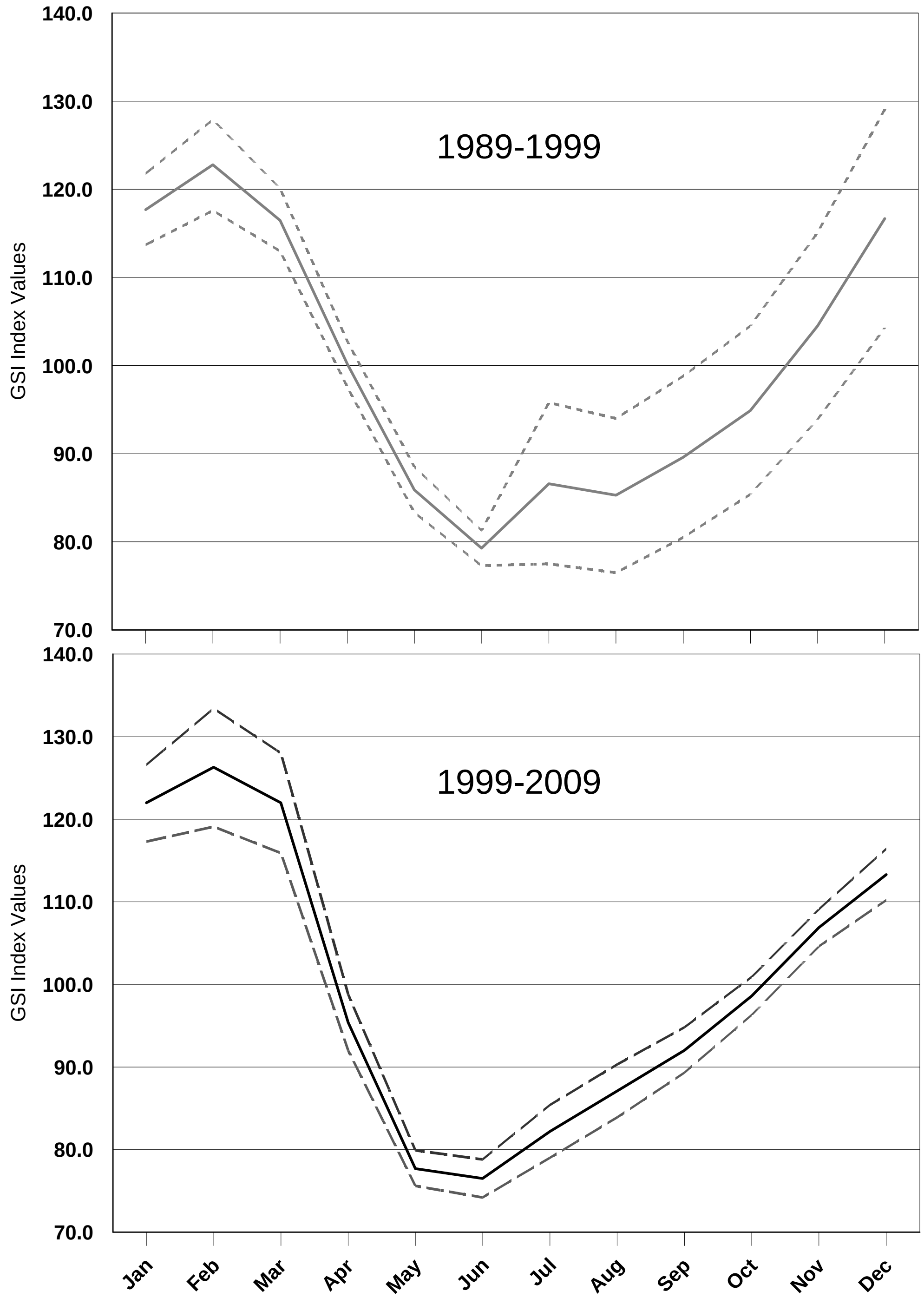
Months	**1990-1999**	**1999-2009**
January	117.7	122.0
February	122.8	126.3
March	116.5	122.0
April	100.2	95.4
May	85.9	77.7
June	79.3	76.5
July	86.6	82.2
August	85.3	87.1
September	89.6	92.0
October	94.9	98.6
November	104.5	106.9
December	116.7	113.3
High-Low (Seasonal Price Spread) Difference	43.5	49.8
High-Low (Seasonal Price Spread) %	54.9	65.0

Source: calculated from monthly maize price data published by MoAFS, Government of Malawi

Figure 4.3: Comparison Maize GSI Sub-Periods 1989-99 and 1999-09

Source: GSI index data as set out in Table 4.5

Figure 4.4: Comparison of Variation around Mean GSI in Two Sub-Periods



Source: calculated from monthly maize price data published by MoAFS, Government of Malawi

Comparing these mean differences between highest and lowest price months in the two sub-periods, using a variety of statistics for small sample comparisons, fails to yield a significant difference in seasonality between the periods. The most that can be said therefore from this comparison is that no detectable change in the degree of maize price seasonality can be verified for this 21-year period, despite the apparent presence of such a change in the graph with which this chapter started (Figure 4.1 above).

4.3 Seasonality in Other Food Crops

The price seasonality analysis conducted for maize was also undertaken for rice, cassava, beans and groundnuts. These crops of course differ considerably from each other with respect to their agronomy, growing season, harvesting options and roles in food security in Malawi. For example, a significant proportion of rice is grown under irrigated conditions and its harvests are not therefore as closely tied to the annual rainfall cycle as maize. Some of these crops (rice and beans) have shorter growing seasons than maize; others (cassava) can be left in the ground for varying durations, and are lifted for different purposes in food consumption at different points in the seasonal calendar. For these reasons it is to be expected that the different food crops will display different patterns and overall degrees of price seasonality from each other. Nevertheless it is interesting, in comparative terms, to see how these differ from maize. It is also interesting to discover whether seasonality for these crops has been changing over time in a different way from maize, leading to a discussion about why this may be so.

The analysis of seasonality in other crops follows the same procedure as for maize. The price data originates from the same price collection system conducted by MoAFS as maize, and therefore the same caveats about changes over time in the number of markets and their geographical coverage applies. The results of the GSI analysis for other crops are shown in Table 4.6 and Figure 4.5. Maize is also included in the table and graph for comparative purposes. The results reveal that maize displays the most price seasonality and cassava the least. Price seasonality patterns vary according to crop growth cycles and harvesting periods. In this regard, cassava has distinct patterns of price change through the year, compared to those for maize or beans. This is particularly due to variations in harvesting times. Harvesting of other crops is strongly seasonal, with the partial exception of rice due to the proportion of the annual harvest that occurs under irrigated conditions (Malawi, 2004). However, cassava as a staple food for flour processing is harvested throughout the year, while harvesting as a snack crop and for fresh root sales occurs mainly between June and February, when the water content of the root is low. Low water content of the root contributes to improved cooking quality. Cassava plays a particularly important role as a dietary substitute for maize in the peak price months of the lean season.

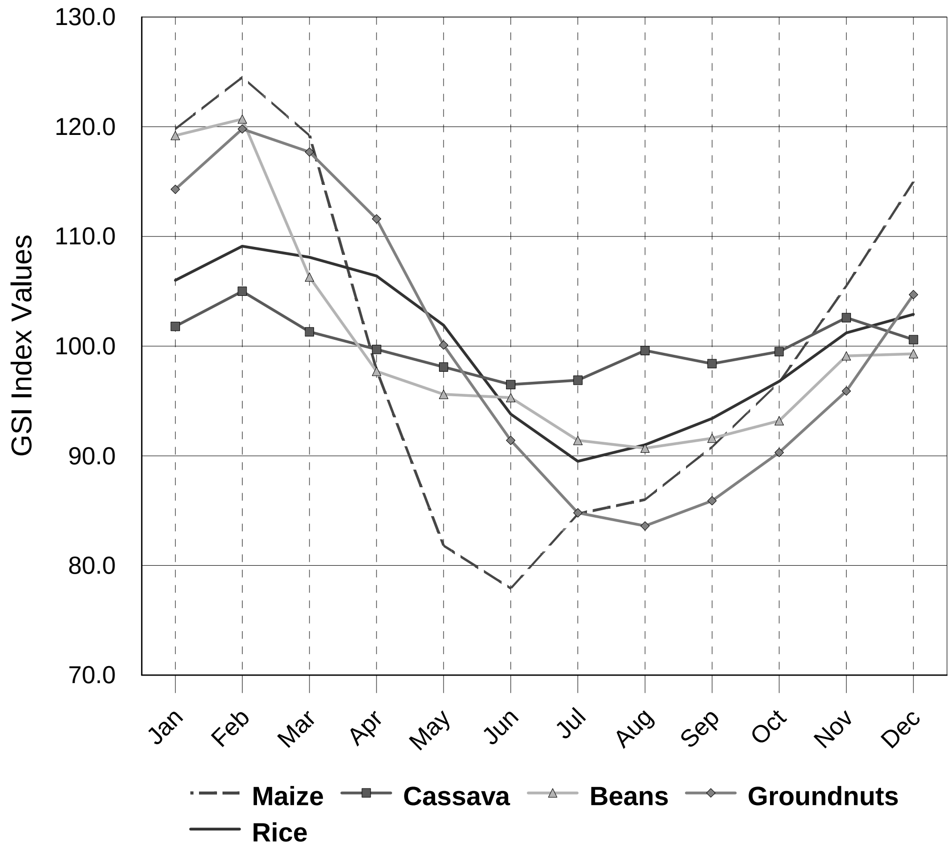
Table 4.6: GSI for Other Crops in Malawi (1990-2009)

Months	**Maize**	**Rice**	**Cassava**	**Beans**	**Groundnuts**
January	119.8	106.0	101.8	119.2	114.3
February	124.5	109.1	105.0	120.7	119.8
March	119.2	108.1	101.3	106.3	117.7
April	97.8	106.4	99.7	97.7	111.6
May	81.8	101.9	98.1	95.6	100.1
June	77.9	93.8	96.5	95.3	91.4
July	84.7	89.5	96.9	91.4	84.8
August	86.0	91.0	99.6	90.7	83.6
September	90.8	93.4	98.4	91.6	85.9
October	96.7	96.8	99.5	93.2	90.3
November	105.5	101.2	102.6	99.1	95.9
December	115.0	102.9	100.6	99.3	104.7
High-Low Difference	46.6	19.6	8.5	30.0	36.2
High-Low % above GSI Trough	59.8	21.9	8.8	33.1	43.3

Source: calculated from monthly food crop price data published by MoAFS, Government of Malawi

All crops reach their peak GSI in February and start declining in March. The pattern of price decline depends on the timing of harvests. For example, the price of beans declines earlier than other crops since the main rainfed bean crop is harvested in March. The prices of other crops do not fall as precipitously, nor reach their lowest point as early as maize. While the lowest seasonal prices for maize and cassava typically occur in June, for other crops this occurs in July (rice), or August (beans and groundnuts). These food markets do not, of course, work independently from each other. Maize, rice and cassava are substitutes in energy foods, and beans and groundnuts are substitutes in protein foods. All food crops are affected by the overwhelming dominance of maize in food markets, such that a shortage of maize leading to higher prices in the maize market has the effect of raising the prices of all other foods, and a surplus of maize has the opposing effect across all food markets. Beans and groundnuts might be expected to conform less to this maize price effect than the starchy staples, but are nevertheless likely to be affected by it to some degree.

Figure 4.5: Comparison Seasonality Patterns Selected Food Crops 1989-2009

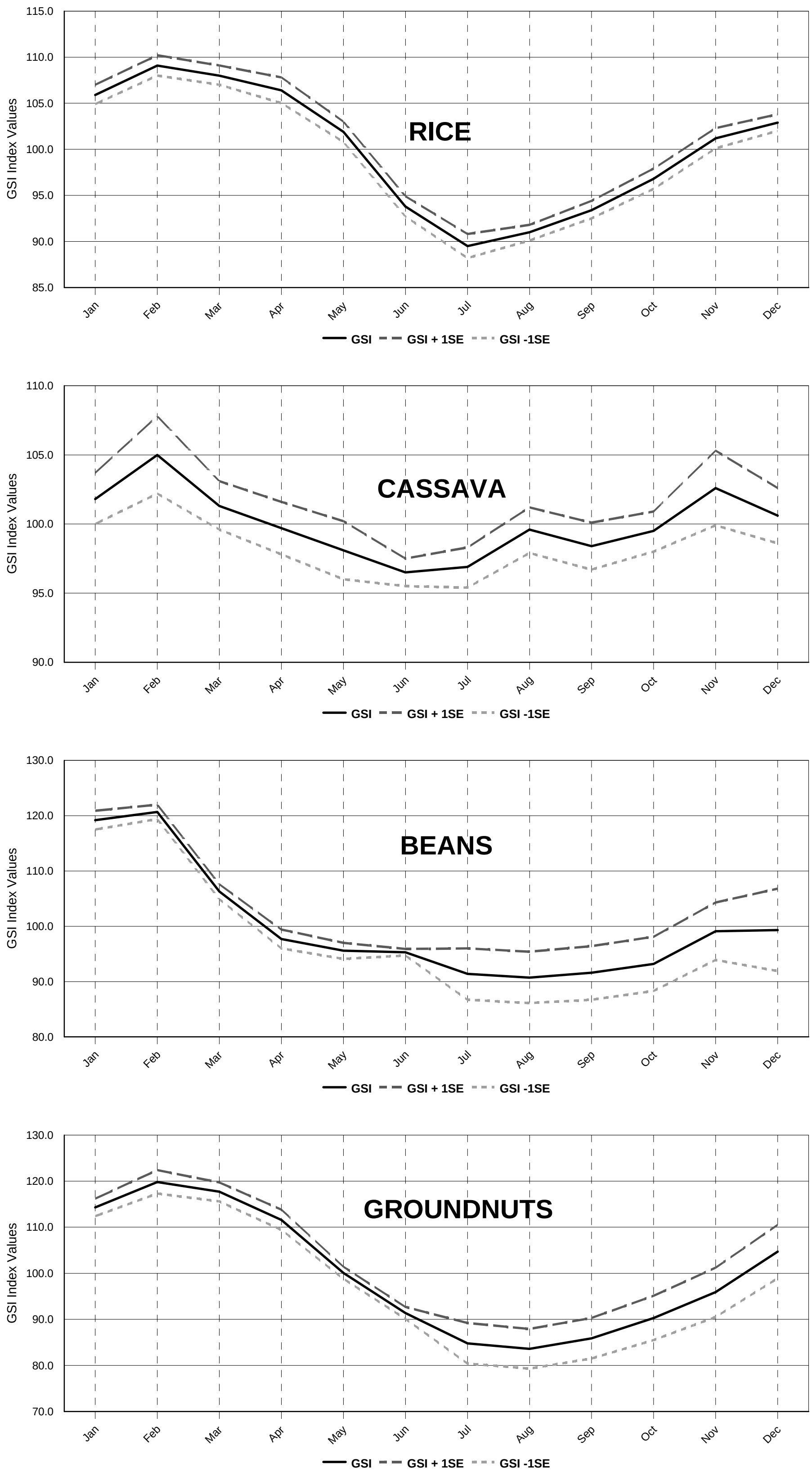


Source: calculated from monthly food crop price data published by MoAFS, Government of Malawi

In specific terms, maize exhibits the now familiar gross seasonal margin of 59.8 per cent, compared to groundnuts 43.3, beans 33.1, rice 21.9 and cassava 8.8 per cent. These differences reflect factors already described; however, duration of storage is also a critical factor. Cassava displays the lowest price seasonality not just because its harvesting can be spread more evenly across the calendar year but because cassava is typically not stored for any duration, either in the household or by traders. As discussed in relation to maize in the previous section (and again in section 4.5 below), in a competitive market the seasonal price change is a storage margin, reflecting the cost of carrying stock for a particular duration between purchase and sale. By far the biggest cost of storage is the rate of interest accruing to the finance tied up in the stock. Since maize has the longest duration between harvest (May-June) and anticipation of the next harvest (Feb-Mar), i.e. 8 months, it is to be expected that the seasonal margin for maize should be higher than for the other crops.

Figure 4.6 displays the degree of variation around the mean GSI pattern for the four crops other than maize over the 21-year observation period. As for maize earlier, one

Figure 4.6: Comparative Patterns and Variability Seasonality in Other Food Crops



Source: calculated from monthly food crop price data published by MoAFS, Government of Malawi standard error either side of the mean GSI is used to capture this variation. It is seen that the degree of stability in seasonal price patterns from year to year is greatest for rice and least for cassava. Beans and groundnuts represent an intermediate case with more stability revealed in the downswing of prices from their peaks than in the upswing of prices in the lean season.

As was done for maize, the GSI values for the other food crops was examined in different ways to see whether any tendency towards narrowing or widening price seasonality could be detected in the data. The first way involved applying a simple linear trend to the GSI values for each individual month, in which the main focus of interest is whether a trend exists in the peak months or trough months, and in what direction. The results of this exercise are tabulated in Table 4.7, including the figures for maize that were discussed before. All the crops with the exception of maize display an upward trend in their trough (lowest price) GSI values. When this is combined with small downward trends in peak GSI values, the result, as shown in the final row of Table 4.7 is an apparent narrowing of seasonal margins (shown by negative values) for all crops except maize. The strength of this effect is largest for beans (for which both the decline in peak GSI and rise in trough GSI are significant at the 90 per cent confidence level. The individual peak and trough trends are not significant for the other crops.

Table 4.7: Comparative GSI Trend Coefficient Values (1989-2009)

Trend Variables		**Maize**	**Rice**	**Cassava**	**Beans**	**Groundnuts**
Peak GSI Trend	Coeff.	0.70	-0.25	-0.07	-0.39*	0.15
	SE	0.75	0.19	0.50	0.22	0.46
	T	0.93	-1.30	-0.13	-1.77	0.34
Trough GSI Trend	Coeff.	-0.27	0.37	0.21	0.47*	0.30
	SE	0.29	0.23	0.18	0.23	0.23
	t	-0.94	1.60	1.16	2.03	1.34
Combined Coeff. Change (direction of change in seasonal margin per year)		0.97	-0.62	-0.28	-0.86	-0.15

*significant at 90%; $p < 0.10$
Source: calculated from monthly food crop price data published by MoAFS, Government of Malawi

This approach can be refined by examining trends in the difference between peak and trough level SI levels for the 21-year period. As already noted, while February is consistently the peak month in the annual price cycle for all food crops, the trough month varies between them. For beans and groundnuts, the lowest price month tends to be August, while for rice it is July, and for cassava it is June, as in the case for maize. The application of simple linear trend regressions to these differences yields some interesting findings (see Table 4.8). Beans and rice display significant trends at the 95 per cent confidence interval; while groundnuts and cassava do not do so, and nor does maize.

Table 4.8: Linear Trends Applied to Peak-Trough Index Differences, Selected Food Crops

Statistic	**Maize** (Feb-Jun)	**Rice** (Feb-Jul)	**Cassava** (Feb-Jun)	**Beans** (Feb-Aug)	**Groundnuts** (Feb-Aug)
Trend coeff.	0.879	-0.754**	-0.551	-0.895**	-0.166
SE coeff.	1.052	0.317	0.583	0.325	0.519
t-statistic	0.835	-2.380	-0.945	-2.749	-0.263
Signif.	0.415	0.029	0.358	0.014	0.796

**significant at 95%; $p < 0.05$
Note: months in brackets are the peak and trough months for that crop
Source: calculated from monthly food crop price data published by MoAFS, Government of Malawi

The second way that changes in price seasonality over this observation period are examined is by dividing the period into two equal sub-periods and examining whether seasonality differs in its characteristics between them. For this exercise, the overall time-series data from 1989 to 2009 was split into the two sub-periods, 1989-1999 (up to December, and 1999 (from July) up to 2009. The results for peak and trough GSIs in the two periods are provided in Table 4.9. This displays some similar and some distinct results compared to the preceding method. Cassava, beans and rice display substantial drops in the GSI index gap between peak and trough values, from the first period to the second period, ranging from a fall of 34.2 per cent for cassava, to 30 per cent for rice, and 29.5 per cent for beans.

For cassava, this produces a stronger outcome than that obtained from using linear trends; while for groundnuts the reverse is the case. Nevertheless, the direction of change is not contradicted for any of the crops, between these two ways of trying to capture such change. Especially for beans and rice, the evidence points in the direction of a declining gross margin to storage over the past two decades. Possibly, this is because private marketing of such crops has become more competitive and efficient over this time interval. An ensuing conjecture is that crops that receive less attention from government than maize may be able to benefit more from the widening and deepening of private trade that has occurred in Malawi. This thesis returns to this point later, especially in Chapters 6 and 7.

Table 4.9: Selected Food Crops GSI Comparison Sub-Periods 1989-99 and 1999-2009

GSI Variables	Maize	Rice	Cassava	Beans	Groundnuts
1989-99					
Peak GSI	122.8	110.7	108.2	121.2	115.9
Trough GSI	79.3	87.0	93.6	90.0	84.3
Difference	*43.5*	*23.7*	*14.6*	*31.2*	*31.6*
1999-09					
Peak GSI	126.3	107.9	105.7	114.7	119.0
Trough GSI	76.5	91.3	96.1	92.7	88.8
Difference	*49.8*	*16.6*	*9.6*	*22.0*	*30.2*
% Change in Differences	**14.5**	**-30.0**	**-34.2**	**-29.5**	**-4.4**

Source: calculated from monthly food crop price data published by MoAFS, Government of Malawi

4.4 Seasonality in Different Maize Markets

Having examined seasonality descriptively for the comparison between maize and other food crops, the section turns to comparisons between different regional maize markets. In a competitive domestic market with spatial arbitrage taking place between areas with maize surpluses and areas with maize deficits, the expectation might be that all markets across the country would display similar patterns and depths of seasonality to the average for the country as a whole. However, there are several factors that might cause this not to be the case, some of which are relatively straightforward to examine, while others considerably less so.

A first consideration is variation in transport costs and times between markets that may mean that prices adjust only with a lag, and imperfectly, even in an otherwise reasonably competitive setting. In a very poor country, such differences in the 'friction' of commodity movement between different areas might be expected to cause differences in seasonality between markets located on major trunk routes and markets located in more remote rural areas, with the latter being prone to greater seasonal fluctuations than the former. In Malawi, these variations in the ease and speed of transport between markets are also affected by restrictions on movement applied unevenly at police roadblocks (often located at major road intersections down the length of the country), with barriers to internal movement tightened in some periods and relaxed in others.

A second consideration is difference in timing of harvest in different parts of the country, and in Malawi maize ripens first at the southern end of the country (late April, early May) and last at the northern tip of the country (late May to July). A third consideration is the relative abundance of surplus grain at harvest time, with high surplus producing rural areas likely to encounter the steepest plunge in prices at harvest time, especially if they are also remote with respect to good access roads or urban centres. Cross-border trade in maize also affects these patterns, since it mainly occurs at border points adjacent to maize surplus rural areas. Table 4.12 (section 4.5 below) provides some estimated figures for the volume of cross-border imports in recent years. High volumes of cross-border imports coincide with the advent of large harvests in production zones close to the Malawi border in Mozambique, Tanzania and Zambia. Traders take advantage of higher maize prices in Malawi than in these adjacent zones (Jayne *et al*., 2009), but their effect in Malawi itself may be to lower harvest prices further by increasing the volume of surplus grain available in harvest months.

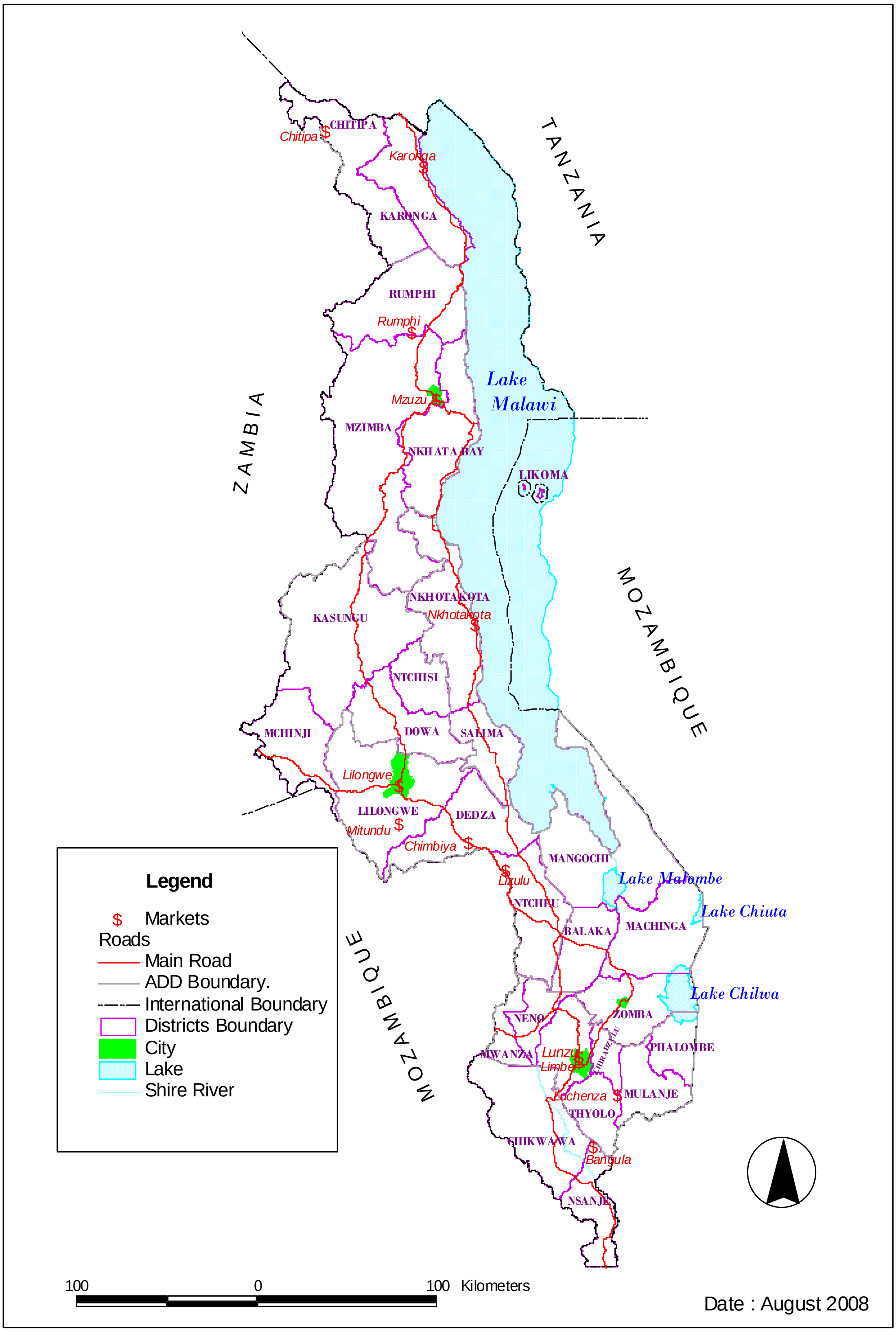
A fourth consideration is government action in terms of a host of different policy levers including formal imports, exports, releases from stores, purchases into stores, food aid and so on. Government action tends to be more piecemeal than the other considerations discussed here. These different considerations interact with each other in very complicated ways across the length and breadth of Malawi, and, for government action, at different points in time. It is not considered likely that their relative importance will be resolved just by looking at seasonality descriptively across different regional markets, but it may nevertheless be possible to lend support or otherwise to some of the hypothesized effects suggested.

The seasonality analysis for local markets comprises selecting markets for which complete, or nearly complete, monthly price time-series exists from 1989 to 2009. This rules out markets that have only recently been included in the price collection system. In the end, ten markets were utilized for the analysis, and these are shown on the map provided at Figure 4.7. The markets, running from north to south down the country, are Chitipa, Rumphi, Mzuzu, Lilongwe, Mitundu, Chimbiya, Lizulu, Lunzu, Limbe and Bangula.

These markets exhibit important locational differences. Chitipa and Bangula are notably extreme geographical outliers, at the northern and southern end of the country respectively, and they are district markets located in rural areas. Mzuzu, Chimbiya, Lilongwe, Lizulu, Lunzu and Limbe are large rural or urban markets, located on the main north-south road spine of the country, and they include the capital city (Lilongwe), as well as Lunzu rural market and Limbe city market that are located 20 km to the north and 10 km to the southwest of Blantyre respectively. Other markets are Mitundu, located about 40 km from Lilongwe, and Rumphi located off the main M1 road, but an important rural centre in northern Malawi. The seasonal analysis of these markets is provided in Table 4.10 below, which includes a comparison with the national average results already discussed in detail.

The table reveals considerable variation in the pattern and depth of maize price seasonality across the country. The lowest seasonality is exhibited in Lilongwe, Limbe and Bangula in the south of the country (45 per cent gross seasonal margin), while the highest occurs in the rural markets of Lunzu in Blantyre and Mitundu (in Lilongwe district), at 90 per cent gross seasonal margin. The finding that over a 21-year period some markets can exhibit twice the gross seasonal margin of other markets in a small country suggests that there are indeed significant frictions in the spatial evening out of prices across the country; and this is reexamined using cointegration analysis in Chapter 5.

Figure 4.7: Map of Malawi Showing Location of 10 Selected Maize Markets



Source: MoAFS Land Resources Department

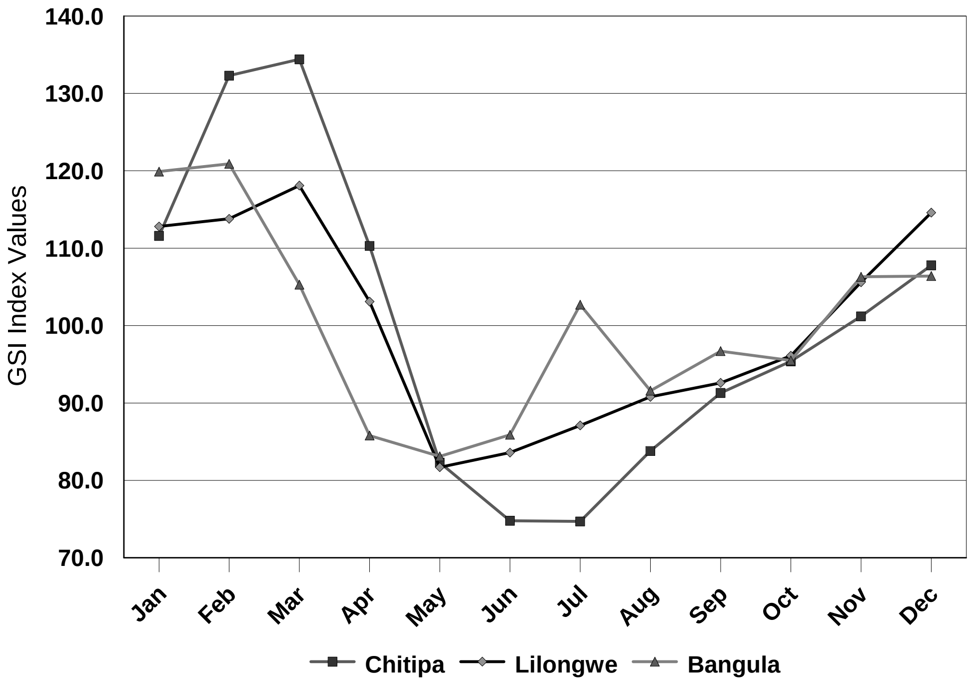
Table 4.10: Maize Seasonality Analysis (GSI) for 10 Regional Markets 1989-2009

Months	National Average	Chitipa	Rumphi	Mzuzu	Lilongwe	Mitundu	Chimbiya	Lizulu	Lunzu	Limbe	Bangula
Jan	119.8	111.6	116.0	114.2	112.8	127.1	113.6	121.9	130.4	115.4	119.9
Feb	124.5	132.3	118.2	113.3	113.8	139.5	124.6	132.1	129.3	116.7	120.9
Mar	119.2	134.4	128.7	116.3	118.1	140.8	127.9	124.3	120.7	109.6	105.3
Apr	97.8	110.3	104.9	110.6	103.1	90.1	112.8	111.9	88.9	92.5	85.8
May	81.8	82.3	84.3	91.5	81.7	74.6	92.4	85.3	67.9	86.7	83.1
Jun	77.9	74.8	79.9	85.2	83.6	74.1	79.9	74.5	72.7	80.5	85.9
Jul	84.7	74.7	82.7	78.1	87.1	79.5	84.1	73.5	77.7	99.8	102.7
Aug	86.0	83.8	84.5	88.0	90.8	83.7	82.1	76.5	86.8	95.7	91.6
Sep	90.8	91.3	93.6	91.7	92.6	85.5	83.4	87.3	91.3	94.2	96.7
Oct	96.7	95.4	97.1	97.9	96.1	89.0	97.3	92.8	97.8	93.2	95.5
Nov	105.5	101.2	101.2	104.3	105.6	100.7	100.1	105.3	111.8	106.1	106.3
Dec	115.0	107.8	108.8	108.8	114.6	115.4	101.9	114.6	124.8	109.7	106.4
High-Low	46.6	59.7	48.8	38.2	36.4	66.7	48	58.6	62.5	36.2	37.8
% Margin	59.8	79.9	61.1	48.9	44.6	90.0	60.1	78.7	92.0	45.0	45.5

Source: calculated from monthly market maize price data published by MoAFS, Government of Malawi

Patterns of price seasonality in different markets are indeed seen to exhibit influences of some of the factors listed above. In particular, seasonality differs moving from south to north in correspondence with the changing timing of the maize harvest on the south-north axis. In Bangula, Limbe and Lunzu in the south, the price peak is reached in January, is held in February, and the price trough occurs in May (Bangula and Lunzu) and June (Limbe). In Chitipa, Rumphi and Mzuzu in the north, the price peak occurs decisively in March, and the lowest price occurs in June or July (Chitipa). These locational effects can be seen strongly in Figure 4.8 which compares the price patterns in Bangula and Chitipa with a middle location, Lilongwe. The graph also shows the greater seasonality in the Chitipa market (80 per cent gross seasonal margin) compared to the other two markets.

Figure 4.8: GSI Comparison Bangula, Lilongwe and Chitipa Markets 1989-2009

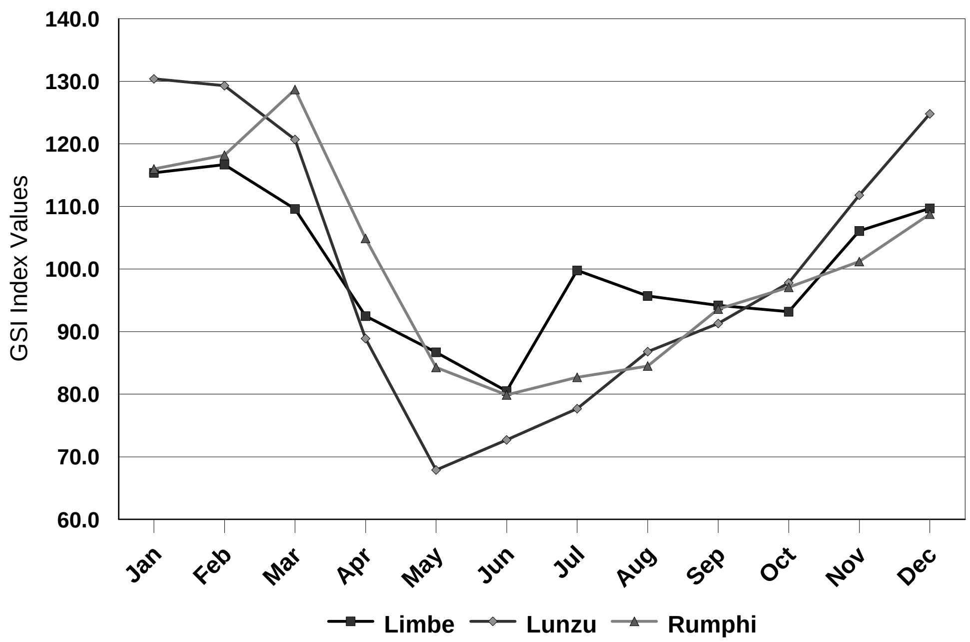


Source: calculated from monthly maize market price data published by MoAFS, Government of Malawi

In the set of ten markets, there are four that exhibit strikingly high seasonal variations in prices relative to the average for the country as whole. These are Chitipa, Mitundu, Lizulu and Lunzu. The factors that these markets have in common is their location in surplus producing rural areas, and their proximity to transport routes or entry points that bring imported maize in from adjacent countries. This suggests that it is the size of the maize surplus at harvest time that is a key determinant of the depth of trough prices relative to peak prices attained in the next lean season. Moreover, for deep rural areas such as Chitipa or Mitundu, high peak prices also occur since a reverse flow of maize from urban storage centres out to remote rural areas is required when those areas run out of available maize three or four months before the next harvest. This explanation is reinforced by comparisons to the low seasonality markets of Mzuzu, Lilongwe, Limbe and Bangula that are places that neither experience the immediacy of harvest surpluses, nor the problem of remoteness from stocks later in the lean season. It is perhaps not surprising that Lilongwe displays the lowest price seasonality in this set of markets, being adjacent to the biggest maize storage facility in the country, and at the intersection of several of the most important road routes in the country.

Figure 4.9 captures some of this variation by comparing seasonal price patterns for Limbe (low seasonality), Lunzu (high seasonality) and Rumphi (medium seasonality). Limbe market is located on the outskirts of the commercial city of Blantyre and has a seasonality pattern affected by proximity to the urban centre, excellent transport routes, and nearby public grain storage facilities. Lunzu, by contrast, is in a high maize harvest zone with a trough price in June that has the lowest GSI value for any market in the set. Rumphi represents a mixed picture and consequently a medium seasonality position. It is in the middle of a rural area that is important for crops other than maize, and therefore does not experience the big maize surpluses at harvest of some other rural areas; it does,

Figure 4.9: GSI Comparison Limbe, Lunzu and Rumphi Markets 1989-2009



Source: calculated from monthly maize market price data published by MoAFS, Government of Malawi however, exhibit a high peak GSI index in March reflecting its position off the main north-south access road, and away from major maize storage facilities.

As expected, this examination of differences in seasonality between regional markets makes some additions to the understanding of maize price seasonality overall in Malawi, but leaves many questions unanswered. The degree of statistical integration between markets is left to later in the thesis (Chapter 5), and this has also been examined by other researchers (see Section 4.5 below). The key discoveries of this section are the occurrence of very considerable variation between the least seasonal and most seasonal markets (45 per cent against 90 per cent gross seasonal margin), and the discerning of seasonal patterns that follow the timing of the maize harvest from south to north. There also emerges some indication that cross-border trade may be an important factor altering the depth of seasonality in some parts of the country, although this is a provisional observation only, and is not subject to more penetrating investigation in this thesis.

4.5 Interpreting the Findings

This chapter has so far emerged with four key findings concerning price seasonality in the Malawi maize market in the period 1989 to 2009:

(1) the maize price in Malawi is highly seasonal; on average the highest price month (February) experiences a retail price in markets that is 60 per cent above the lowest price (June);

(2) for maize, there has been no detectable decline in price seasonality over this twenty year period, despite a considerable body of evidence that crop market functioning in Malawi in terms of competition and efficiency has been improving (see discussion below, as well as in Chapter 5);

(3) a comparison with other food crops reveals that all the selected crops (rice, cassava, beans, groundnuts) display lower seasonality overall than maize (seasonal margins vary between 8.8 and 43.3 per cent); moreover, price seasonality for them seems to be diminishing over time, and this is confirmed especially for beans and rice;

(4) the pattern of seasonality for maize is similar across maize markets in different parts of the country; however, the timing of seasonal troughs and peaks vary by roughly one month running from the south to the north of the country, and surplus

producing rural areas exhibit substantially greater seasonal margins than urban markets or markets close to urban areas or on main transport routes.

These findings can be interpreted in the light of work done by other researchers on the maize market in Malawi. A particular pattern and depth of price seasonality reflects numerous agricultural and economic factors. The single harvest for maize is an important agronomic reason explaining the difference in average seasonality between maize and other food crops, although this does not help with the apparently diminishing depth of seasonality for the other crops, not experienced by maize. The other food crops have harvests that are more spread out during the calendar year, or are multiple in character (shorter growing seasons, irrigation in the case of rice). However, the main concern here is not with these agronomic aspects, but with factors in markets that may help to explain the findings for maize. Three such factors are considered here: first, the relationship between seasonality and storage costs; second, the relationship to domestic supply and demand considerations; and third, the relationship to international maize prices.

It was stated earlier that the difference in GSI levels between high seasonal price months and low seasonal price months represents a gross margin to storage. More precisely, when this index difference is expressed as a percentage mark up on the lowest price month, it represents a percentage gross storage margin. This can be interpreted as a gross real return to storage (see Trotter, 1992, p.13). This is because the derivation of the GSI values involves removing the long-term trend component of a price time-series. The seasonal real gross storage return (GRSR) then can be set out as follows:

$$\text{GRSR} = \frac{\text{Highest GSI} - \text{Lowest GSI}}{\text{Lowest GSI}} \times 100$$

As examined in preceding sections, the gross storage margin for maize in Malawi has averaged 60 per cent across the decades of the 1990s and 2000s. Interestingly, this is almost identical to the gross return to storage in maize found by Timmer (1986a) in Indonesia where a margin of 59 per cent was measured, using a similar calculation to that used here. This contrasted in the Indonesia case, around the same historical period, with an 11 per cent gross seasonal margin for rice (Trotter, 1992). A gross storage margin must be interpreted in terms of the duration of grain in store that it represents, and the costs of storage. In Malawi, the overall margin of 60 per cent pertains to purchase of maize in June and its sale in February, an 8-month storage period. Therefore, on average the gross return to storage is 7.5 per cent per month. Whether such a margin represents a competitive return to storage is a matter to which this discussion returns shortly.

In the meantime, the GSI analysis allows the pattern of monthly gross returns to storage to be examined in more detail, and this is done in Table 4.11. The table shows the changing aggregate size of the margin if maize purchased at the lowest prices in June is sold in successive downstream months – July, August, September etc. The cumulative margin clearly increases for stocks held through to February, after which it declines to March and disappears quickly through April and May. The final column of the table shows the average margin per month represented by the cumulative margin figures. This provides a high gross margin rate (8.3 per cent) for holding maize for just one month (to July), with this figure then diminishing to 5+ per cent through August to October, and rising again for the period November to February. The highest average monthly return (other than July) is obtained by holding maize until December. In principle, if this pattern of returns were known to traders, they would either go for a 'quick return' strategy by selling in July, or hold maize to obtain strong average returns towards the end of the calendar year and after. In fact some seasonal patterns observed in the preceding analysis do seem to correspond to a wave of 'sell in July', as one storage strategy (see, for example, the GSI pattern for Limbe market in Figure 4.9 above).

Table 4.11: Seasonal Margin in Successive Months for Maize Purchased in June

Month of Sale	No. Months since June	Gross Seasonal Margin from June	Gross Seasonal Margin per Month
Jul	1	8.3	8.3
Aug	2	10.0	5.0
Sep	3	16.1	5.4
Oct	4	23.7	5.9
Nov	5	35.0	7.0
Dec	6	47.2	7.9
Jan	7	52.7	7.5
Feb	8	58.6	7.3
Mar	9	51.9	5.8
Apr	10	25.5	2.5
May	11	5.3	0.5

Source: calculated from monthly maize price data published by MoAFS, Government of Malawi

So far costs of storage have not been considered with respect to this gross margin. The principle costs of storage comprise the interest rate on the loan required to purchase crop from farmers (or from other traders); losses in store; rent of storage space (for traders who do not possess their own storage); chemical treatment of crop in store to prevent infestation by pests; and transport costs into and out of store. Data on these different variables for Malawi is fragmentary, with partial insights offered in various sources. Information compiled in Jayne *et al.* (2008a) is quite helpful in gaining some purchase on the difference between gross and net monthly returns to storage.

In Malawi, there are wildly varying estimates of losses in store: researchers often use 10 per cent as a rule-of-thumb, while the Malawi government tends to invoke a high figure such as 30 per cent (Jayne *et al*., 2008a). On the basis of an admittedly fairly limited (but at least properly measured) sample, Jayne *et al.* (2008a) came up with a range of farmer and trader values for losses that average out at 14 per cent. At a retail maize value in June 2009 of 32 MK/kg, a 14 per cent loss is equivalent to a cost to the storage agent of 4.5 MK/kg. The same document provides evidence on rental costs of storage, chemical treatment and transport (2007-08 data). These average out at roughly 3.2 MK/kg (rental cost), 0.5 MK/kg (chemical treatment), and 1.8 MK/kg (transport), over an 8-month storage period. If we take the June 2009 price of 32 MK/kg as a starting point, then a 60 per cent gross margin on this would equal 19 MK/kg, and the implication of these figures would look something like:

Net margin = 19 MK/kg <u>minus</u> (4.5+3.2+0.5+1.8) = 9.0 MK/kg = 28.1% over 8 months = 3.5% per month.

These are very rough back-of-the-envelope calculations, but their limited purpose is to demonstrate that once storage costs are taken into account, an apparently quite large gross margin can shrink quickly to one that looks plausible in terms of the cost of servicing the loans required for crop purchase. None of the figures cited so far include the financing costs of the storage function. These latter costs apply even if a trader or storage agent is able to fund crop purchases from their own resources of capital. This is because money tied up in the stock has an opportunity cost in terms of what that same money could earn if placed in an alternative investment. During the period under discussion, formal (government) interest rates in Malawi varied between 20 per cent and 60 per cent, with a mean of 36.8 per cent over two decades from 1990 to 2009 (IMF, *International Financial Statistics*, various years). The latter figure is 3.1 per cent per month, so a relatively small upward adjustment to account for differences between market and state interest rates would coincide with the net margin derived above. Sources such as Jayne *et al.* (2008a) demonstrate the great heterogeneity and variation in the various different elements of storage costs. For this reason, the derivation of an average, as partially done for illustrative purposes above, has to be treated with due circumspection. Traders differ widely in how long they hold stock (small traders for short periods, bigger traders for longer periods), in the transport costs they incur (distance from purchase to storage points varies over a wide range), in the losses they incur in store (depending on the quality of the storage infrastructure), and in the amount they pay for loans (the less formal the loan and the higher risk the borrower, the greater the interest rate on loans). In principle, sufficient information could allow proper averages to be calculated for these various cost components, but the cost of acquiring such information could become prohibitively large. Efficiency in the temporal function of crop marketing therefore tends to be assessed through more indirect means, and one alternative chosen by Myers (2008) is to examine the gross storage margin econometrically by comparing price adjustments across a range of markets.

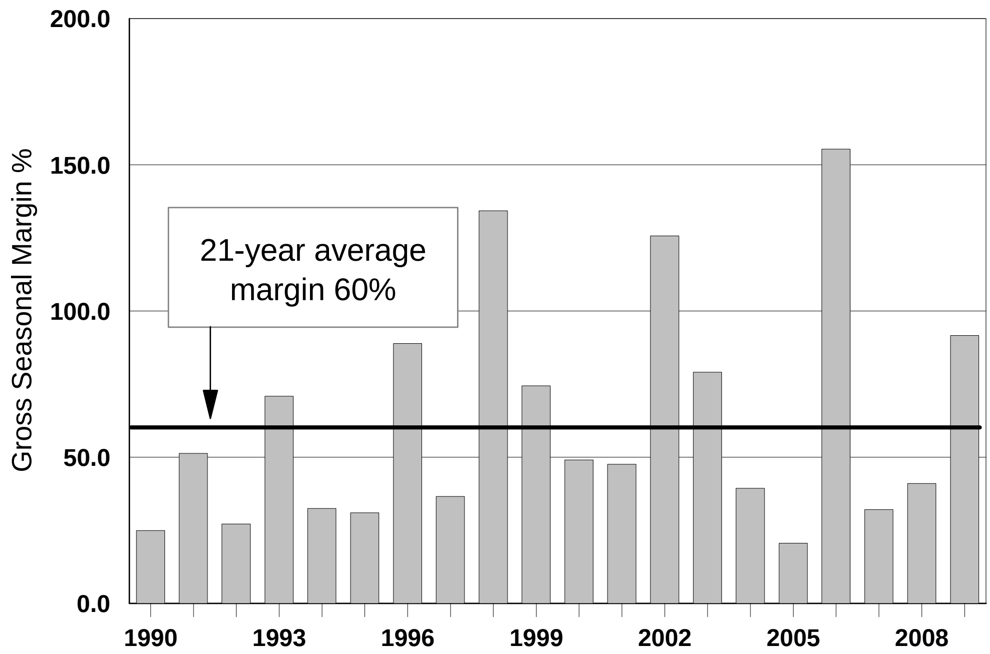
Myers uses a technique called threshold auto regression (TAR) to examine both spatial price adjustments and seasonal storage margins in Malawi. This technique allows for non-linearity in adjustments, and specifically for price switching in pairs of markets when the flow of trade reverses between them. The spatial integration aspects of Myer's analysis are taken up later in this thesis in Chapter 5, in connection with a broader discussion and examination of market conduct, structure, and spatial arbitrage. In the context of the discussion here, Myers uses weekly price data to examine deviations from mean prices over time over a period of 378 weeks (Myers, 2008, pp.18-27). The model used by Myers measures the speed with which gross storage margins return to mean levels when they deviate above or below this level. If the speed of this adjustment is rapid, then inter-temporal storage can be interpreted as competitive and efficient, since the advent of 'excess margins' results quickly in price adjustments that reduce the margin towards the underlying equilibrium level. Myers finds that the adjustment lag in 10 maize markets is less than one week, a figure comparable to that found in grain markets in the US, and he concludes that storage in the maize market in Malawi is efficient.

The second important dimension of maize market seasonality in Malawi reflected upon here is the influence of production and supply fluctuations on the degree of seasonality experienced. It is most important in this context to distinguish production from supply, and to consider the separate influences on supply of exports, imports and domestic stock changes (purchases into stock or sales out of stock). If external trade in maize were relatively frictionless (maize could be ordered today, and would arrive reliably in the required quantities in a week's time) and if stock changes were quickly responsive to changing market conditions, then the huge price fluctuations observed in Figure 4.1 would not occur, or be substantially dampened relative to what has occurred historically in practice.

The seasonality analysis of this chapter is designed to remove cyclical, trend and random elements from long run price trends so that just the seasonality effect of price changes is captured. However, given the size of the fluctuations which have occurred historically, the removal of cyclical effects from the time-series is incomplete, and the GSI index changes between high and low price months to some degree reflect these intermittent price shocks. This is shown in Figure 4.10 that provides a bar chart of the difference in gross seasonal margin between the February SI and the June SI for each year in the period 1989 to 2009. The mean difference (the GSI gross margin of 60 per cent) is also shown on the graph. The big spikes in the seasonal margin shown on the graph coincide with the largest spikes shown in Figure 4.1 for raw prices expressed in real terms. In other words, 1992/93, 1995/96, 1997/98, 2001/02 and 2005/06 were all crop seasons displaying most unusually large seasonal margins due to production falls in those years, and the size of these cyclical margins comes through in the SI and GSI analysis.

This pattern of variation suggests that traders are probably able to capture temporary rents to storage in seasons when maize is in short supply. However, Figure 4.10 also shows, equally, that there are seasons when the gross storage margin is squeezed down to extraordinarily low levels that would seem to be insufficient even to cover the financing cost of storage. For example, the gross (Jun-Feb) margin is under 30 per cent in 1990, 1992 and 2005. Several different trends and behaviours occur in these differing circumstances. In years of abundant supply from domestic production, the volume and duration of carryover necessary to satisfy demand in the lean season is reduced due to the greater number of months during which food-deficit farmers are able to supply themselves with maize for consumption. Traders adjust their own storage durations and amounts to these circumstances accordingly. In shortage years, opposing forces apply. It becomes worthwhile to store larger quantities of grain for longer, and speculative

Figure 4.10: Gross Seasonal Margin Between June and February, 1989-2009



Source: calculated from monthly maize price data published by MoAFS, Government of Malawi

behaviour regarding the scale of future shortages is bound to creep in. Nevertheless, the unpredictability of later outcomes (for example, a decision by government to flood the market from store if it is in a position to do so) increases the risk of taking 'long' positions in maize storage, so 'hoarding' in order to reap unusual rewards to storage is a high risk strategy.

As discussed already in Chapter 2, the supply of maize from domestic production in Malawi is a 'thin' market, where the term 'thin' refers to the small proportion of total production and consumption that is available to exchange in markets. Jayne *et al.* (2008a, p.12) report data from an Agricultural Inputs Support Survey (AISS) conducted in 2007 that suggest that maize sales only comprise 14-15 per cent of total output, and that only 18-21 per cent of all farmers sell maize in a typical harvest season. The thinness of the maize market in Malawi is on its own a substantial explanation for the massive price fluctuations that occur when there is a cyclical production shortfall, for the reasons described in Chapter 2. However, shortages from domestic supply are moderated to some degree by informal cross-border imports from neighbouring countries, and these have been highly significant in recent years as shown in Table 4.12 (Jayne *et al.*, 2008a). In the 2000s, the norm has been for Malawi maize prices to be higher than the country's neighbours after harvest, with the result that these informal inflows occur. While these are approximate estimates obtained from monitoring cross-border grain movements at obvious crossing points, their importance in the context of a domestic maize supply fluctuating around 300-325,000 tons (Jayne *et al.*, 2008a) can be seen to be quite large.

Table 4.12: FEWSNET Estimates of Informal Cross-Border Maize Imports 2004/5-2008/9

Crop Year	**Tanzania**	**Zambia**	**Mozambique**	**Total**
	-----------------------------metric tons--------------------------			
2004/05*	2,656	2157	71,229	76,206
2005/06	84,862	419	71,218	165,451
2006/07	1,888	378	77,394	79,525
2007/08	1,886	1,779	56,078	60,466
2008/09**				49,723

Notes: * April of 2004 to March 2005. ** only includes the first 5 months of the 2008/09 season (April-August).

Source: Jayne *et al.* (2008a)

The response of government to anticipated or actual changes in maize availability is critical both for explaining how severe maize availability deficits in practice occur, and for considering in what ways these might be avoided in the future. Most of the discussion of this occurs in Chapters 6 and 7 of this thesis, which examine maize availability crises in the 2000s in considerable detail, including the political dimension of such crises. Here, it can be noted that the record of government decision making is mixed in this regard, and when confronted with an emerging or potential maize market crisis, on occasions decisions have been taken that have reduced the severity and the duration of the crisis, while on other occasions the opposite has been the case. An impending crisis can be forestalled by release of strategic stocks, rapid purchase of imports, or appeal for food aid, and sometimes combinations of such actions have indeed helped to prevent a market crisis turn into a humanitarian disaster. On the other hand, as will be seen in Chapter 6, on other occasions, government has exacerbated an emerging shortage of supply by attempting to ban informal imports, preventing the free interior movement of grain, and delaying formal imports.

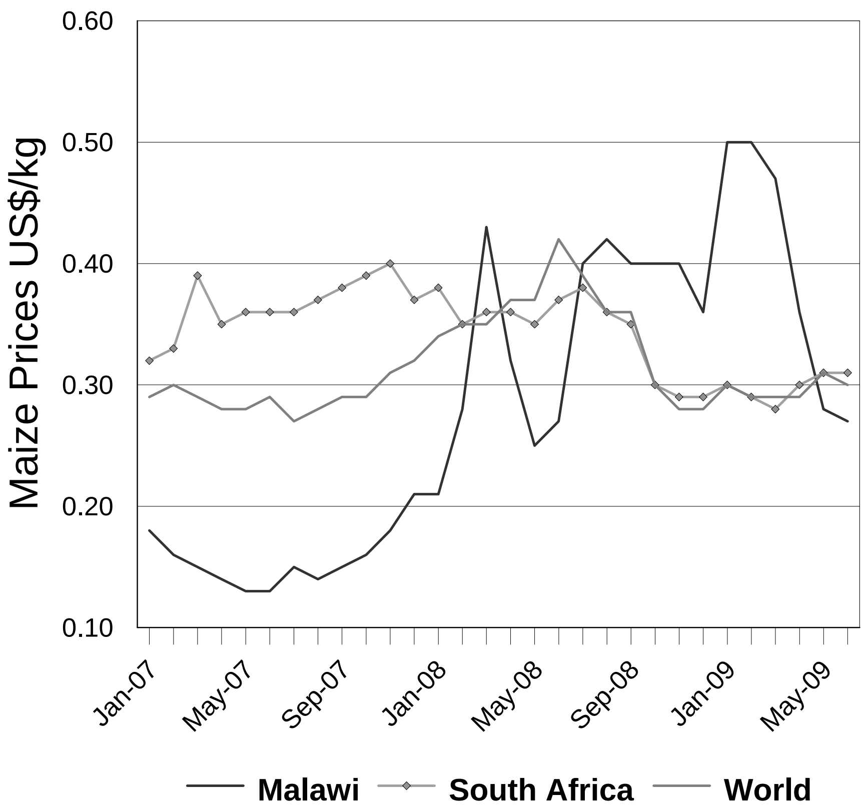
The final dimension of maize price seasonality in Malawi considered here is that of the relationship between domestic and international maize prices. In general, in an open economy, the domestic price of a staple food commodity might be expected to follow international prices allowing for transport costs and lags, and changes in a country's exchange rate. However, Malawi along with several other countries in eastern and southern Africa is considered to be largely decoupled from international prices for maize for a variety of reasons (World Bank, 2006; Conforti *et al*., 2009; IMF, 2009). Being landlocked with high transport costs from the nearest commercially available stocks of maize or ports of entry is one such factor. Malawi and Zambia are similar in this respect, and for Zambia the average transport cost for maize purchased in South Africa has been estimated at US$120 per ton in recent years (Jayne and Tschirley, 2009). The cost to Lilongwe from the same origin is thought to be close to this amount (Ibid.). A second factor is a strong preference in consumption for local white maize over yellow maize which is the predominant type available in the world market. A third reason is the variation of domestic supply around long run domestic demand, so that recourse to international markets is infrequent, and does not occur routinely and smoothly along well-established channels.

The key factor in this is transport costs, as well as other frictional costs associated with imports and exports. Countries like Malawi have a huge gap between import and export parity prices due to these costs, and this provides a wide margin within which domestic prices may fluctuate without reference to international prices. More recently, however, both Malawi and Zambia have experienced periods in which domestic prices have risen above import parity, yet there has not been a smooth market response to this occurrence, and critical issues of the degree of control that governments retain over import decisions, coupled with the lack of trust between governments and private traders, lie behind the incidence of such events (Jayne *et al*., 2009; Tschirley and Jayne, 2008).

Figure 4.11 below demonstrates the divorce between Malawi domestic and international prices in the period January 2007 to June 2009. The graph compares Malawi average retail prices converted to US$ at official exchange rates, with the price trend for white maize in South Africa (SAFEX) and the international maize price at South African ports.

The South Africa and international maize prices are raised by a transport cost constant of US$120 per ton, as mentioned above. The graph shows the price spike that occurred in world maize prices in June 2008, in which prices had doubled in six months over their levels of mid- to late-2007 (the global food price crisis). In this period, Malawi maize prices display a seasonal peak in advance of the international price spike,

Figure 4.11: Maize Price Comparison: Malawi, South Africa and World (monthly data, US$ per kg, Jan 2007 to Jul 2009)



Source: FAO-GIEWS
Government of Malawi: Lilongwe, Retail, Ministry of Agriculture and Food Security
South Africa: Randfontein, Wholesale, SAFEX Agricultural Products Division
World: yellow maize, FOB Gulf Ports, UNCTAD Commodity Price Statistics

followed by a decline to low levels while international prices reached their peak. Then, as international prices fell sharply from their highest levels through the second half of 2008 and into 2009, the price in Malawi rose to unprecedented levels above import parity through late 2008 and early 2009. It should be noted that the exact vertical placement of the Malawi prices on this graph relative to the other prices is dependent on the constant transport cost assumption made, which may be inaccurate. However, that Malawi breached import parity in these periods is not in doubt according to other researchers (Jayne *et al.*, 2009).

The consensus view is, then, that Malawi is somewhat decoupled from the world maize market, especially in the short term and with respect to seasonal price fluctuations. The movement of prices over an interval such as that shown in Figure 4.12 generally display little evidence of world and Malawi prices moving together, and for periods in the range of 3-6 months they are more often than not seen to be moving apart from each other. However, the short and medium term trends may differ from the long term in this respect, and this is examined econometrically using a method called vector auto regression (VAR) in a recent paper by Rapsomanikis (2009). Rapsomanikis examines price time-series relationships between the world price (yellow maize), South Africa SAFEX price (white maize), and eight maize markets in Malawi.

The VAR analysis found that short-run effects between maize prices in Malawi and the international and SAFEX prices were statistically insignificant. In the short run prices may drift apart 'due to local market conditions and policies' (Rapsomanikis, 2009, p.30). However, in the long run prices were found to converge. South African SAFEX prices converge to US yellow maize No.2 Gulf prices in approx. 7-8 months. Malawi prices in different markets converge to the SAFEX price in 5-6 months and to the world price in 4-8 months. The results are reproduced in Table 4.13 below. In this table the figures in

Table.4.13: Estimated Lags in Price Adjustment between Malawi and World Markets

	Chitipa	**Karonga**	**Rumphi**	**Bangula**
Co-movement with				
International price (yellow)	strong	strong	moderate	Strong
South African price (white)	strong	strong	strong	Strong
Causality	World → domestic	World → domestic	World → domestic	World → domestic
Months to full adjustment to International (South Africa) price	6.6 (5.0)	4.7 (4.8)	(8.3)	3.8 (4.7)
	Salima	**Mitundu**	**Liwonde**	**Mzuzu**
Co-movement with				
International price (yellow)	weak	strong	strong	strong
South African price (white)	strong	strong	strong	strong
Causality	world → domestic	world → domestic	world → domestic	world → domestic
Months to full adjustment to international (South Africa) price	-(5.3)	5.8 (5.0)	7.7 (6.4)	5.5 (6.1)

Source: Rapsomanikis (2009, p.30)

brackets are statistically significant time lags for adjustment to the SAFEX white maize price, while the figures not in brackets (if there) are significant time lags for adjustment to world yellow maize price. The conclusion is that long run convergence between domestic and world prices does take place, confirming also the finding of Jayne *et al*. (2006) that maize prices in countries like Malawi converged towards import parity during the 2000s.

To summarize this discussion, the seasonality analysis for Malawi shows that, on average, peak seasonal prices for maize, occurring in February, are 60 per cent above the lowest seasonal prices, occurring in June. There is no verifiable change taking place over time in maize seasonality, whereas for beans and rice there is moderately firm evidence that price seasonality declined during the period 1989-2009. Regional maize markets in Malawi display similar patterns but differing intensities of seasonality, compared to the national average, some of which can be explained by proximity to rural surplus-producing zones or to cross-border trade. The 60 per cent gross seasonal margin cannot be taken as evidence of non-competitive storage margins on the part of traders and storage agents. For one thing, similar gross margins have been observed for maize elsewhere; for another, storage costs can be shown to take up a substantial proportion of such a margin; and finally econometric analysis of short run price movements indicate that margins in different markets converge with less than a one week lag towards an equilibrium level (Myers, 2008). The seasonality analysis does not wholly eliminate the effects of unusual price spikes on average margins, and the fairly frequent occurrence of these spikes is caused by severe imbalances between available supply and demand. The patterns of events that result in these outcomes are explored in Chapter 6 below. International price trends are ruled out as being responsible for cyclical and seasonal price changes in the Malawi maize market, but in the long run domestic prices do converge towards international equivalent levels in both white and yellow maize markets.

Chapter 5 : Maize Market Conduct, Structure and Spatial Integration

5.1 Introduction

This chapter has two main purposes. The first is to report the findings of the fieldwork on maize marketing conducted in three villages in Malawi in May-August 2008, just after the maize harvest. The methodology of this fieldwork has already been described in Chapter 3, as also some basic information on relative poverty and wealth in the case-study villages as discovered from participatory wealth ranking conducted in each village. The second is to summarise the findings of a cointegration analysis undertaken on monthly price data in 13 markets, in order to test spatial maize market integration in Malawi. These two objectives play important roles in this thesis in understanding competition, the strength and diversity of the private sector, and the degree of efficiency exhibited in Malawi maize markets. These aspects have been examined by other researchers (for example, Jayne *et al.*, 2008a; Rapsomanikis, 2009); however, not in the specific context of a focus on price seasonality. In particular, the results reported here help to shed light on the central problem investigated in this thesis that is the conjunction of events, market functioning and public decisions that result in the repeated occurrence in Malawi of severe seasonal price shocks out of all proportion to the average price seasonality observed in the long term.

In marketing studies, the structure of the market is concerned with the number, diversity and size of market participants in different stages of marketing chains leading from the producer to the consumer. The conduct of these participants refers to their honesty (e.g. with weighing scales), timeliness, adherence to quality standards, reliability in purchase and delivery, ability to meet contracts (where such are required), and other attributes that result in trust in market transactions and the emergence of arms-length rather than personalised exchanges (Ellis, 1990: Ch.5; Timmer *et al.*, 1983; Baumol and Blinder, 2003). The structure and conduct of the Malawi maize market is tackled in this chapter by reference to the fieldwork undertaken in 2008. Market performance i.e. the overall efficiency of the marketing function is a combination of structure and conduct attributes with observable outcomes in terms of spatial and vertical price formation. The cointegration analysis specifically tackles price adjustment between different markets, and therefore provides an indirect insight into spatial arbitrage (the movement of maize in response to price signals indicating surpluses or deficits in different places).

There is a broad consensus amongst those who have studied maize marketing in Malawi that the private sector has expanded substantially in terms of the number and diversity of traders in the years since liberalisation was initiated in 1987 (e.g. Chilowa, 1998). This has especially occurred on the small scale at local levels where in the harvest season daily and weekly markets spring up across the country to facilitate the rapid throughput of maize offered by farmers for sale at harvest time. Small-scale traders are mainly unregistered, and many of them operate only during the period when there is produce immediately available to trade. According to Jayne *et al.* (2008a) the number of small-scale traders has multiplied rapidly, while medium-scale traders have remained relatively stable and large-scale traders have declined in numbers slightly over the past two decades. These authors estimate that in 2008, ADMARC purchased only 8 per cent of maize sold by farmers, with the private sector accounting for all other maize sales (Table 5.1).

Table 5.1: Estimated Proportion of Maize Sold by Farmers to Different Buyers in 2008

Area	**Category of Buyer**				
	ADMARC	**Farmer buyers**	**Small traders**	**Medium/ Large**	**Total**
Blantyre	14.4	38.1	46.5	0.0	100.0
Mulanje	0.0	19.9	34.7	45.4	100.0
Lilongwe	16.6	16.7	41.7	25.0	100.0
Dowa	5.0	0.9	1.0	88.1	100.0
Mchinji	4.0	7.0	21.6	67.4	100.0
National	8.0	16.5	29.1	45.2	100.0

Source: (Jayne *et al.,* 2008a, p.12)

The private sector comprises both informal and formal sub-sectors. The informal private sector mostly comprises one-person businesses typically using their house as the warehouse, tending to be opportunistic and mobile, and buying as little as one 50 kg bag of maize or less in a transaction. In Malawi, medium-scale buyers are typically defined as traders handling quantities up to 2,000 tons maize per year; and the majority of these are unregistered. By comparison, formal private sector buyers are mostly large, registered companies that operate in the domestic market at a national scale handling thousands of tons of maize per year. Examples of such companies are Mulli Brothers, Export Trading and Rafik, any of which can handle transactions exceeding 1,000 tons in a single contract. Such traders often enter into firm advance commitments for sale to the

National Food Reserve Agency (NFRA), non-governmental organisations involved in food security operations (NGOs), the World Food Program (WFP), or large state purchasing institutions like the health service (Jayne *et al.,* 2008a: pp.17-19).

The Grain Traders and Processors Association of Malawi (GTPA) has a classification system for its members, in which traders who have the capacity to supply 1,000 metric tons or more in a single lot belong to the gold category, and those whose capacity is less than this belong to the silver category, which is thus composed of the medium and the smaller sized registered traders. In May 2008, the association had 83 private traders registered in its gold category, and 90 private traders in its silver category. A proportion (estimated at 12 per cent) of registered private traders are also processors and engage in assembly, transportation, storage and repackaging of maize. Membership of GTPA is, however, voluntary, so some significant private actors are not captured in the association's data. The head offices of association members are concentrated in Lilongwe (66 percent) and Blantyre (25 per cent).

This chapter proceeds as follows. The next section reports the findings of the maize marketing fieldwork conducted in May to August 2008 in three villages, but also involving interviews with key informant traders at various stages in the vertical marketing chain. This covers in sequence: maize inputs and harvesting; sales decisions and proportions; food security position of farm families; farm level maize storage and local level flour processing; sales prices and trader types; maize marketing chains; medium and large traders; marketing margins; and marketing problems prioritised by farmers and traders respondents. Section 5.3 reports the results of the cointegration analysis on spatial market integration for selected 13 markets scattered across the country. Section 5.4 provides a synthesis and interpretation of the findings of the chapter.

5.2 Fieldwork Findings

5.2.1 Inputs, Harvesting and Production

This and subsequent sub-sections of this chapter provide descriptive statistics about a wide variety of different aspects of maize marketing at farmer level, and in trader operations beyond first point of purchase. The data is reported by individual villages: Mission village in the Southern Region; Chinteka village in the Central Region; and

Jenda village in the Northern Region; as well as for averages or totals across all villages. In general, the sample size is 30 farm households in each village; therefore providing a total sample of 90 households across all three villages. However, this number is sometimes drastically reduced with respect to trading since fewer farmers than expected undertook maize sales in the harvest season in question.

As already discussed in Chapter 3, the maize harvest season in 2008 in Malawi turned out to be much weaker in terms of surplus sales by farmers than had been predicted by advanced crop estimation procedures (on the basis of which research sites had been selected). In addition, there was a recognised flaw in the decision to stratify the sample by relative wealth, since this meant that village samples contained a high proportion of non-surplus producing maize farmers (the author has learned from this mistake). Nevertheless, and despite these difficulties, a lot of valuable information was collected from farmers and traders contributing to the understanding of the working of the Malawi maize market at local levels.

Some basic pre-harvest data regarding land ownership and maize cultivation in the three sample villages is provided in Table 5.2. This reveals substantial differences in the mean land ownership of sample households at 0.45, 1.45 and 1.11 ha respectively for the Mission, Chinteka and Jenda sample. There is considerable variation around these mean figures as shown by the coefficient of variation (CV). It is recalled that the wealth ranking exercise suggested high rates of landlessness in these villages, corresponding to 58, 47 and 26 per cent of households in the three villages. Nevertheless, the sample did not pick up on this landlessness, and it is thought that villagers and respondents replied differently to questions about land, depending on how they (the respondents) contextualised the question being posed. This was particularly evident in Mission village where in group discussions about relative poverty and wealth, respondents clearly wanted to impress on researchers how poor the village was; however, when they mistakenly thought that the sample survey was to do with eligibility for subsidised fertilizer coupons, suddenly it turned out that all villagers did have access to at least some land (possessing land for maize production is a prerequisite for receiving the fertilizer subsidy). This reveals the value of triangulating results using different methodological approaches, as well as the necessity to be wary about how respondents interpret the reasons for the presence of researchers.

Table 5.2: Farm Size and Area Cultivated to Maize, Sample Households

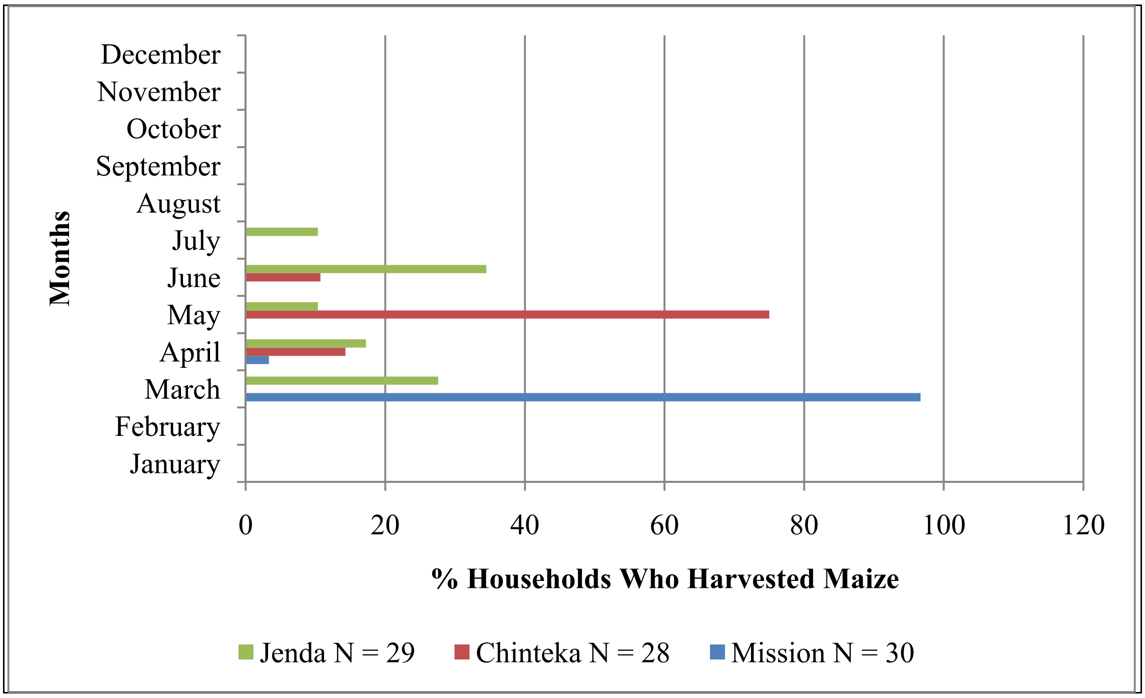
		Mission	Chinteka	Jenda	Total
	Total FHHs No.	205	110	68	383
	Sample FHHs No.	30	30	30	90
(a)	***Area Owned Sample (ha)***[1]				
	Total land	13.56	40.67	32.27	86.50
	Mean land	0.45	1.45	1.11	0.99
	CV	0.67	0.67	0.59	0.58
	Mode land	0.40	0.81	0.40	0.40
	Min land	0.10	0.40	0.20	0.10
	Max land	1.21	4.05	2.83	4.05
(b)	***Maize Area Sample (ha)***				
	Total area	11.43	19.77	17.00	48.20
	Mean area	0.38	0.66	0.57	0.54
	CV	0.60	0.34	0.65	0.78
	Mode area	0.40	0.40	0.40	0.40
	Min area	0.10	0.04	0.20	0.04
	Max area	1.21	3.24	1.62	3.24
(c)	***Maize share total land (%)***	84.3	43.6	52.6	55.7

Source: Fieldwork in three villages conducted by the author May-August 2008
[1] Chinteka and Jenda had one and two households respectively who did not own land but grew maize

The mean area cultivated with maize of sample households was a lot more similar than their total land area at 0.38, 0.66 and 0.57 across the three villages respectively (0.54 for all sample respondents taken together). Again, there is quite a lot of variation around these means. The modal land cultivation was practically identical across all villages at 0.40 ha (about 1 acre). The proportions of farming area given over to maize cultivation varied from 84.3 per cent (Mission) to 43.6 per cent (Chinteka) and 52.6 per cent (Jenda). Clearly, Mission is the case study village most dependent on maize, as well as being the poorest village and having the smallest farm size. In Chinteka, farmers also specialise in tobacco; while in Jenda they practice diverse cropping systems in which maize, tobacco, horticultural crops and livestock play diverse roles.

It was noted in Chapter 4 that the main maize harvesting period varies in Malawi running from south (earlier harvests) to north (later harvests). This feature is picked up strongly in the sample survey (Figure 5.1). In the most southerly of the villages, Mission, 29 of the 30 respondents reported harvesting their maize in March. This is well ahead of what is considered the main harvest month of May in Malawi. For Chinteka village, maize harvesting occurred between April and June, with the majority of harvest occurring in May. For Jenda, the most northerly village, the maize harvest began in March (in fact, it turned out that this was mainly green maize for roasting), and the harvesting period extends to July, with the main volume being harvested in June.

Figure 5.1: Proportion of Sample Households Harvesting Maize in Different Months (March to July 2008)



Source: Fieldwork in three villages conducted by the author May-August 2008

Table 5.3 provides data on the maize harvest of sample households in the three villages. This displays patterns that are helpful for interpreting later data on maize sales behaviour. The Chinteka village sample produced collectively the largest maize harvest, and the highest level of output per household, but did not exhibit the highest yield per ha, an accolade that firmly belonged to Mission village. Interestingly, the Jenda sample experienced the lowest yield, indeed around half the yield observed in Mission village, despite this being the best off and most cash-based village of the three. Of course, agronomic, fertilizer or rainfall factors could have contributed to this outcome, and this is examined in the next paragraph.

Table 5.3: Maize Production by Sample Households

Output and Yields	Mission	Chinteka	Jenda	Total
Total output (50 kg bags)	403.5	567.5	299.1	1,270.1
Total output (kg grain)	20,175.0	28,375.0	14,955.0	63,505.0
Total area (ha)	11.4	19.8	17.0	48.2
Mean yield/ha (kg/ha)	1,764.7	1,509.5	879.9	1,317.5
Mean output/FHH (kg)	11.4	19.8	17.0	48.2

Source: Fieldwork in three villages conducted by the author May-August 2008

Maize output and yield levels are influenced by access to improved seeds and fertiliser. Households access seed from their own previous crop (recycling) or from purchase. For open-pollinated maize varieties (OPV), recycling is only recommended up to a maximum of three years. For hybrid varieties, new seed is produced and purchased by farmers annually (Smale, 1993). In the sample villages, access to seed through cash purchase is significant for both open-pollinated and hybrid maize seeds (Table 5.4). Coupons issued by the AISP are however, the major means by which sample households accessed hybrid maize seed in the 2007/08 maize season. Transfers from relatives or other households also play a limited role as a means of accessing seed. In considering what sets Jenda apart in maize output and yields, both seed and fertiliser may be implicated. In particular, hybrid seed requires good growing conditions and prescribed applications of non-organic fertiliser in order to achieve its full yield potential.

The Jenda sample was found to utilise the highest proportion of hybrid seed while at the same time their total and per household fertiliser use was lowest. It would seem that relatively poorer fertilizer use could provide an explanation for the lower yields in Jenda. This is confirmed statistically by the Pearson product moment ‘r’ test that shows a strong positive relationship of amount of fertiliser used and quantity of maize harvested for Mission and Chinteka. The significance value of 0.00 for both villages is less than 0.05. The computed ‘r’ of 0.727 for Mission and 0.732 for Chinteka exceeds the critical value at the 0.01 level (r =0.463, d.f.=28) (Cohen and Holliday, 1982 p.146).

It is concluded that the observed relation between the amount of fertiliser used and the amount of maize harvested by sample households in Mission and Chinteka villages are related to the population from which the sample was drawn. However, for Jenda the results show that there is no significant relationship between the amount of fertiliser used and quantity of maize harvested since its ‘r’ value is below the critical value (r=0.463 d.f =28), therefore the results do not apply to the population from which the sample was taken.

Table 5.4: Means of Access and Type of Maize Seed and Fertiliser Used, 2007/08 Season

	Variable	Mission	Chinteka	Jenda	Totals
a	**Hybrid Maize Seed**	n = 22	n = 18	n = 21	n = 61
	Total kg	187.5	171.0	219.0	577.5
	Mean kg	8.5	9.5	10.4	9.5
	Purchased %	44.5	49.1	43.8	45.8
	Coupon %	26.7	21.6	48.9	32.4
	Recycled %	27.7	29.2	6.9	21.3
	Gift %	1.1	0.0	0.5	0.5
b	**OPV**	n = 10	n = 17	n = 8	n = 35
	Total kg	125.0	222.5	92.0	439.5
	Mean kg	12.5	13.1	11.5	12.6
	Purchased %	63.2	13.3	27.2	34.5
	Coupon %	0.0	0.0	2.2	0.7
	Recycled %	36.8	80.0	70.7	62.5
	Gift %	0.0	6.7	0.0	2.3
c	**Fertiliser**	n = 30	n = 30	n = 30	n = 90
	Total 50kg bags	57.7	62.9	52.3	172.9
	Mean 50 kg bags	1.9	2.1	1.7	1.9
	Purchased %	0.0	52.3	54.5	35.6
	Coupon %	100.0	47.7	44.9	64.2
	Gift %	0.0	0.0	0.6	0.2

Source: Fieldwork in three villages conducted by the author May-August 2008

5.2.2 Retention and Sales Decisions by Sample Households

Across the three villages, most sample households did not engage in maize sales. The relevant data on sales behaviour is provided in Table 5.5. Overall, only one third of households sold maize at harvest or announced their intention to sell maize later. This proportion varied greatly in different places, however, with 74 per cent of Mission households engaging in sales while this proportion was only 19 per cent and 7 per cent in Chinteka and Jenda respectively. Since Mission was the poorest village of the three, with the smallest farm sizes, this finding seems counterintuitive. However, qualitative probing in a focus group revealed that the reason for this was 'desperation selling' connected with a dire lack of cash by harvest time, and the need to make essential purchases or repay loans. In the better off villages, farm families had broader options for raising cash resources, either from agriculture (tobacco, horticulture), or from wage work (*ganyu*) or other activities (e.g. petty trading, livestock sales). The important consequence of this finding is that the occurrence of sales does not necessarily mean that farmers are surplus producers. As shown shortly, in the Mission case, the sale of maize at harvest reduces the food security of families, making them have to resort to the market to cover their food gaps in the lean season.

Table 5.5: Maize Output and Sales, Sample Households

Aggregate Sample (50 kg bags)	**Mission n=30**	**Chinteka n=30**	**Jenda n=30**	**Total n=90**
Total harvest	403.5	567.5	299.1	1270.1
Planned consumption	253.9	452.5	287.1	993.5
Consumption %	62.9	79.7	96.0	78.2
Total intended sales	149.6	115.0	12.0	276.6
Sales %	37.1	20.3	4.0	21.8
Immediate sales	140.6	24.0	9.0	173.6
Deferred sales	9.0	91.0	3.0	103.0
HHs selling maize No.	23	6	2	31
HHs selling maize %	74.2	19.4	6.7	33. 4

Source: Fieldwork in three villages conducted by the author May-August 2008

As shown in Table 5.5, overall 78 per cent of maize harvested was retained for home consumption, while 22 per cent was sold immediately or represented intended (deferred) sales. This proportion is higher than the average sales proportion typically estimated for maize in Malawi at around 15 per cent (Jayne *et al.*, 2008a); but then these villages were selected for their potential to be maize surplus producing research sites. Again there is a difference between villages in this proportion, with the better off villages displaying higher consumption shares than Mission village. However, this is explained by the same considerations already noted. In Mission village, desperation sales leave households more exposed to food insecurity problems later in the year. By contrast, in Jenda village households are able to assign nearly all their maize production to a food security role since their cash needs can be met from other sources. In general, the findings here are similar to those discovered by previous researchers on this aspect of the maize market in Malawi (Smale, 1995; Nyirongo *et al.,* 2001; Lall *et al.,* 2009). Maize is typically retained for own consumption for food security purposes, and sales only occur either for desperation reasons (small, very poor farmers in locations with few other activities) or, more obviously, when a surplus above consumption requirements is produced (larger farmers and especially good production seasons).

The Pearson product moment test was applied to see if there was a statistically significant relationship between the amount of maize harvested and sold at harvest time in Mission, and Chinteka, and the pooled data of the three sample villages. Jenda was included only in the pooled data because of the limited number of FHHs who sold maize at harvest (only two) which could not allow further analysis. The results show that the amount of maize harvested and sold at harvest is positively correlated (Mission 0.893, Chinteka 0.706, and aggregate data 0.652). The relationship is significant, Mission and aggregate data have the significance value of 0.00 that is less than 0.05, and all are significant at 0.01. The 'r' value is above the critical value at 0.01 level (r=0.526, d.f.= 21), and for the pooled data the 'r' value of 0.652 exceeds the critical value at the 0.01 level (r=0.0.456, d.f.=29). The observed relationship is therefore applicable to the population from which the sample was taken for Mission and pooled data. Chinteka results show that the amount of maize harvested is not related to amount of maize sold since the significance value of 0.12 is more than 0.05 , the 'r' value of 0.706 is below the critical value at 0.05 level (r=0.811, d.f.=4), therefore the Chinteka results do not relate to the population from which the sample was taken. An explanation which accords with these results is that although Chinteka farmers harvested more maize than in the other villages, they sold little because they preferred to keep the maize for food security purposes and cultivated tobacco for cash sales.

Further analysis was carried out on the Mission data to examine whether the various household wealth groups identified during the participatory wealth ranking exercise had an influence on participation in the maize market in terms of quantity of maize sold. It can be recalled that Group 1 in Mission wealth ranking represented the well off households and Group 4 the poorest households, with the other groups falling in between. The results show that the wealth group with the largest proportion of families participating in selling maize soon after harvest was surprisingly Group 4 (Table 5.6). This finding contrasts with that of other researchers who found that the largest proportion of a sample of targeted input beneficiaries who sold maize in 2001 were the wealthiest category (Nyirongo *et al.,* 2001). In terms of amount of maize sold, the results show that a large number of poorer farmers sold small amounts of maize, while a few well-off farmers sold large quantities. This is consistent with IHS-2 findings that the largest maize sellers, accounting for 50 per cent of total sales, were undertaken by 1.2 and 1.5 per cent of the total sampled households in 2002/03 and 2003/04 respectively (Jayne *et al.,* 2008a p.10). The finding means that markets at harvest time in the type of context represented by Mission comprise very large numbers of small transactions. Relative village wealth does not necessarily correspond to high maize market participation, as illustrated by Jenda, because alternative sources of cash income means that maize is primarily retained for home consumption. The same considerations apply in a rather different way in the 'middle' village, Chinteka, which has elements of both high maize yields and alternative cash income sources, again leading to low maize sales at harvest.

Table 5.6: Mission Village Participation in the Maize Market by Wealth Group

Wealth Group	**Sample Size**	**HHs Selling No.**	**HHs Selling %**	**Quantity Sold bags**	**Quantity Sold %**
1	6	4	17.4	58.0	41.3
2	7	5	21.7	30.0	21.3
3	7	6	26.1	20.6	14.7
4	10	8	34.8	32.0	22.8
Total	30	23	100.0	140.6	100.0

Source: Fieldwork in Mission conducted by the author May-August 2008

Most of the sample households that sold maize in Mission (87 per cent) and Chinteka (50 per cent) did so immediately after harvest in order to generate cash to buy consumer goods (Table 5.7), while the few who deferred sales did so, on average for three months, with wide variation between individuals with respect to this behaviour. The other reasons mentioned for harvest sales were to meet school fees, to pay off debts, all with equal incidence in the Mission and Chinteka samples. The results are consistent with Jayne, *et al.* (2008a p.8) who report that in sample areas of Blantyre, Mulanje, Lilongwe, Dowa and Mchinji districts, many households sold their maize to meet immediate cash needs.

Table 5.7: Reasons Given for Maize Sales Immediately After Harvest

Category of Reason	Mission		Chinteka		Pooled	
	n =23	%	n = 6	%	n = 29	%
Surplus maize	0	*	1	16.7	1	3.5
Cash needs (debts)	1	4.4	1	16.7	2	6.9
Cash needs (school fees)	1	4.4	1	16.7	2	6.9
Cash needs (purchases)	20	87.0	3	50.0	23	79.3
Capital needs (business)	1	4.4	0		1	3.5
Total	23	100.0	6	100.0	29	100.0

Source: Fieldwork in Mission conducted by the author May-August 2008
Note: Jenda did not respond.

Turning now to transactions at point of sale by those sample households that did sell maize, 95.7 per cent and 100 per cent in Mission and Chinteka respectively did not always sell their maize to the same buyer, implying that households felt that they had a choice between buyers to whom they could sell. The main deciding factor for households regarding to whom to sell the maize was price, with the buyer offering the best price being the one selected. The few households who reported always selling their maize to the same buyer (in Mission village), stated that they did so, not because the buyer was a relative or friend, but because they gave the best price (Table 5.8). Price was therefore overwhelmingly the priority consideration in selecting the buyer to whom to sell the maize. In general, the results of both household interviews and focus group discussions suggested that at the farm-gate level the maize market is highly competitive with many buyers and sellers participating. Jayne *et al.* (2008a) also reach this same conclusion.

5.2.3 Annual Food Security of Farm Families after Sales

The annual food security position of sample households is approached through triangulation of three parameters: per capita maize consumption, equivalent family size and own farmer calculation of food security position. For sample households, maize retained for home consumption was 134.9 kg per capita across all three villages, with Mission at 99.4, Chinteka at 175.3 and Jenda at 130.0 kg per capita. These figures are

Table 5.8: Households Choice of Buyers and Reasons

Choice and Reasons	Mission		Chinteka		Pooled	
	n= 23	%	n= 6	%	n= 29	%
A. Options of Buyers						
Same buyer	1	4.4	0		1	3.5
Different buyers	22	95.7	6	100.0	28	96.6
Total	*23*	*100.0*	*6*	*100.0*	*29*	*100.0*
B. Buyer Choice (Reasons)						
Best price	13	56.6	6	100.0	19	65.5
Check market first	4	17.4	0		4	13.8
Different buyers (best price)	6	26.1	0		6	20.7
Total	*23*	*100.0*	*6*	*100.0*	*29*	*100.0*

Source: Fieldwork in three villages conducted by the author May-August 2008
Note: only 2 households in Jenda sold maize, so Jenda is not included here

substantially below the estimated national average maize consumption per capita of 201.6 kg for 2007/08 (Table 1.2 in Chapter 1). The results seem surprising given the selection of the case study villages for their expected maize production potential; however, as already discussed in Chapter 3 and other places in this thesis, the 2008 maize harvest came in well below expectations across the country, and its true level relative to published production statistics remains the subject of doubt and conjecture. In focus group discussions in Chinteka and Jenda villages, dry spells in the mid-growing season were cited as reasons for lower than expected harvests.

These average per capita maize retention figures are indicative of potential food security stress in farm families, especially in Mission village with its relatively undiversified agriculture and few other opportunities for gainful employment available. The food security picture can be refined further by adopting an adult equivalent unit (AEU) approach to maize consumption that takes into account age and gender differences in households (Government of Malawi and IFPRI, 2001). The adult equivalent is a weight that is assigned to individual members of a household based on age and sex characteristics relative to that of an adult male. The adult equivalent family size (AEFS) maize requirements for sample households (Table 5.9) has been constructed using weights and formula compiled by the Instituto Nacional de Nutrition (of Mexico) in

1987 as follows (Skoufias *et al.,* 1999 p.78; Government of Malawi and IFPRI, 2001 p.60):

AEHS = (0.41)*children0-4 +(0.80)*children5-10 + (1.15)*males11-14 + (1.05)*females11-14 +(1.38)*males15-19 + (1.05)*females15-19 + (1.26)*males20-34 + (0.92)*females 20-34 + (1.15)*males35-54 + (0.85)*females35-54 + (1.03)*males>=55 + (0.78)*females>=55

The top of Table 5.9 contains data for each village sample as a whole, and across all samples, on total household members, mean household size, mean adult equivalent household size, and adjusted total household members using the adult equivalent approach. The aggregate quantity of maize retained for home consumption for all sample households is also provided. The middle and bottom segments of the table contain two alternative measures of the degree to which households meet their food security requirements from maize. The first of these measures assumes that 55 per cent of dietary calories for household members are obtained from maize (Jayne *et al*., 2008a). However, there are reasons associated with the balance between production and consumption in MoAFS' time-series to suspect that this figure is much too low. For this reason, the alternative share of maize in dietary calories of 71 per cent (discussed in Chapter 1) is used as an alternative measure, in order to provide a range.

The calculations proceed as follows. The daily adult calorie requirement for Malawi is 2,366 calories, and one kg of maize supplies 3,578 dietary calories. Therefore, if 55 per cent of required calories are met by maize, each adult equivalent unit will need to eat 0.364 kg of maize per day; and if 71 per cent of calories are met by maize, each AEU will need to eat 0.470 kg of maize per day. These requirements can then be multiplied up to an annual basis (based on 365 days in the year), and this sets the maize needs per year for the sample households (taken together) as shown for each alternative in Table 5.9. Then the degree to which retained maize meets these requirements is shown as a percentage. For example, at 55 per cent calories from maize, the farm households in the Mission sample retained enough maize to satisfy 73.3 per cent of their annual requirement; while at 71 per cent calories from maize, the equivalent figure was 56.8 per cent. Such percentage figures can also be converted into months' duration of the family maize stocks. Thus 56.8 per cent represents 6.8 months of coverage of dietary calories from maize for the average sample family.

Table 5.9: Sample FHHs Food Security Position from Own Production Using AEFS

Category	Mission n=30	Chinteka n=30	Jenda n=30	Total n=90
Total HH members	138	136	136	410
Mean HH size	4.60	4.47	4.53	4.53
Mean AEFS	4.35	4.15	4.21	4.24
Total AEFS members	130.4	124.5	126.2	381.1
Maize retained (kg)	12,695	22,625	14,355	49,675
55% calories from maize				
Maize needs per year (kg)	17,322	16,542	16,762	50,626
Mean coverage %	73.3	136.8	86.6	98.1
<u>HHs achieving coverage:</u>				
<80%	17	13	21	51
80-90%	5	0	1	6
90-100%	2	0	0	2
>100%	6	17	8	31
71% calories from maize				
Maize needs per year (kg)	22,367	21,360	21,643	65,369
Mean coverage %	56.8	106.0	67.0	76.0
<u>HHs achieving coverage:</u>				
<80%	25	14	23	62
80-90%	0	1	0	1
90-100%	3	0	0	3
>100%	2	15	7	24

Source: Fieldwork in three villages conducted by the author May-August 2008

Table 5.9 also shows the number of households that fall into different coverage ranges, deriving from these calculations. Less than 80 per cent coverage means that maize supplies will last a maximum of 9.6 months in that group, and so on. Only in Chinteka village do the majority of households retain enough maize to be more than self-sufficient, indeed between 50 and 60 per cent of sample households in that village were truly self-sufficient in maize based on these calculations. By way of contrast, 57 per cent of the sample households in Mission village fell into the ‘less than 80 per cent’ group at the lower maize contribution to dietary calories, rising to 83 per cent at the higher maize contribution to dietary calories. Jenda village also displayed a majority proportion of the sample falling into the 'less than 80 per cent' category. As pointed out earlier, the estimated contribution of maize to dietary calories is only half the picture with respect to understanding household food security. The other half of the picture comprises the other options by which households can generate resources that would enable them to purchase maize (or other sources of calories) when they are lacking in maize. Moreover, here there is substantial difference between Mission and Jenda, with the former having few other options, whereas the latter is a relatively well off village in which most household have access to other sources of income in cash or in kind.

The third way of examining food security at the household level is to use farmers' own assessment of their food security position post-harvest. This is done in Table 5.10, which groups farmers' responses to questions about how long their maize stock was expected to last at the 2008 harvest into 3-month bands. Farmers' own views are notably more pessimistic than the food security picture indicated in the preceding exercise. However, there may be interviewee bias in this outcome, since respondents do tend to make their situation seem as difficult as possible if they perceive that interviewers are connected in some way to future government action on their behalf. Nevertheless, the results shown in Table 5.10 conform in relative positioning between villages to the other findings on food security. Both Mission and Jenda villages are insecure on the basis of own maize available for consumption, with 73 per cent of Mission respondents and 77 per cent of Jenda respondents reporting that their own maize would last six months or less. In Chinteka, by contrast, this proportion is 33 per

Table 5.10: Farmers' Own Perceptions about Maize and Food Security

Stated Months Food Security from Maize	Mission		Chinteka		Jenda		Total	
	HHs Within Range		HHs Within Range		HHs Within Range		HHs Within Range	
	No.	%	No.	%	No.	%	No.	%
0-3	7	23.3	5	16.7	17	56.7	29	32.2
3-6	15	50.0	6	16.7	6	20.0	27	30.0
6-9	6	20.0	1	3.3	0	0.0	7	7.8
9-12	1	3.3	5	16.7	3	10.0	9	10.0
>12	1	3.3	13	46.7	4	13.3	18	20.0
Total HH	30	100.0	30	100.0	30	100.0	90	100.0

Source: Fieldwork in three villages conducted by the author May-August 2008 cent. At the other end of the scale in Chinteka, 47 per cent of sample households had in excess of one year's maize needs available following harvest, and this also chimes with the much greater prevalence of later market sales in Chinteka compared to the other villages.

5.2.4 Farmer Storage of Maize

For small farmers in Malawi, the chief method of storing maize is in bags in their houses, and this comes through clearly in the fieldwork in answer to questions about the type of storage that respondents utilised (Table 5.11). Overall, 60 per cent of households stated bags as their main form of storage, and a majority stated this in Mission and Jenda villages. This is followed by traditional *nkhokwes* (granaries), which were the most prevalent storage facility amongst respondents in Chinteka village. A traditional *nkhokwe* is a raised cylindrical structure made from poles and grass, and has a removable thatched roof (Heisey and Smale, 1995).

Table 5.11: Maize Storage Practices, SampleHouseholds

Type of Storage	Mission n = 30	Chinteka n = 30	Jenda n = 30	Total n = 90
Brick roofed granaries No.	0	1	0	1
Brick roofed granaries %	0.0	3.3	0.0	1.1
Traditional *Nkhokwe* No.	2	19	3	24
Traditional *Nkhokwe* %	6.7	63.3	10.0	26.7
Store in bags No.	23	9	22	54
Store in bags %	76.7	30.0	73.3	60.0
Kitchen *Sanja* No.	5	0	0	5
Kitchen *Sanja* %	16.7	0.0	0.0	5.6
Did not respond No.	0	1	5	6
Did not respond %	0.0	3.3	16.7	6.7

Source: Fieldwork in three villages conducted by the author May-August 2008

With regard to losses in store, the majority of sample farmers did not report storage losses that were important enough for them to draw the attention of enumerators to losses as a critical problem. This is interesting given the discussion at the end of Chapter 5, in which maize storage losses in Malawi are put at anything from 15 to 30 per cent. It is recalled that Jayne *et al.* (2008a) estimated moisture related storage losses at farmer level as around 14 per cent. One consideration relates to the duration of storage. Clearly, if maize stocks are going to run out in 4 or 5 months, then losses from deterioration in store are likely to be considerably less than for grain stored for 7 or 8 months or even up to a year from harvest. Another reason for low losses is broader uptake of preservative technologies by farmers than in the past. Actellic dust is the preservative treatment method commonly used by households in Chinteka and Jenda villages (Table 5.12). In Mission village, some sample households used actellic dust, while others used a traditional method called *sanja* (also noted as a storage method in Table 5.11). *Sanja* is a method of treating maize against insect infestation by hanging the unhusked maize cobs above the top of the fireplace in the kitchen (hence 'kitchen smoked'). *Sanja* is an inexpensive form of preservative treatment, but is severely limited in terms of the quantities of maize that can be treated in this way. Its popularity in Mission village is yet another reflection of the poverty of the village, and the low number of months food security from own maize production for most villagers.

Table 5.12: Maize Treatment in Storage, Sampled Households

Type of Treatment	**Mission** n = 30	**Chinteka** n = 30	**Jenda** n = 30	**Total** n = 90
None No.	3	13	9	25
None %	10.0	43.3	30.0	27.8
Actellic dust No.	19	13	5	37
Actellic dust %	63.3	43.3	16.7	41.1
Liquid Actellic No.	4	3	11	18
Liquid Actellic %	13.3	10.0	36.7	20.0
Kitchen Smoked No.	4	0	0	4
Kitchen Smoked %	13.3	0.0	0.0	4.4
Did not respond No.	0	1	5	6
Did not respond%	0.0	3.3	16.7	6.7

Source: Fieldwork in three villages conducted by the author May-August 2008

All the maize used for home consumption in the study villages is processed locally to produce the socially preferred, fine white flour (*ufa woyera*), with the exception of one household in Mission who processed *mgaiwa* (whole maize meal flour). White flour processing involves dehulling shelled maize with a mortar and pestle or hammer mill, winnowing, soaking the dehulled grain in water for fermentation, drying, milling into flour using hammer mill, and sun drying the flour (Smale 1993, p.35). The cost of milling per kg varies, in Mission it was MK2.00, Chinteka MK2.75 and Jenda MK2.50. The number of times maize is processed varies depending on the size of the family, and the quantity processed at a time. Sample households in Mission and Jenda on average processed flour more than twice a month, while in Chinteka this was less twice a month despite sample households having over three times the quantity of maize processed compared to the other study villages. The large quantity of flour processed by Chinteka families reflected the larger amount of maize kept in store by households. The losses in weight from flour processing for the sample households averaged 23.5 per cent in Mission, 24.7 per cent in Chinteka and 16.5 per cent in Jenda. This finding compares to the findings of other researchers that farm level processing losses can be as high as 25 per cent for dent hybrids (Smale and Heisey, 1997, p.26). It is notable that whole maize flour (*mgaiwa*) results in negligible weight loss in processing. Flour processed at village level is almost entirely for home consumption, and not for sale as a processed farm product.

5.2.5 Sales Prices at the Farm Gate or Nearest Market

Prices received by farmers for maize sold soon after harvest varies over time and space, but did not vary much among households in the same location (Table 5.13). In Mission village, where a moderately good sample of sales behaviour was captured, the most prevalent maize price reported by farmers was MK20 per kilo, with some variation (probably competition related) over the range MK15 to MK27 per kilo. Maize prices in Mission village were low relative to the other locations for reasons already discussed in the thesis. Mission represents a deep rural situation, also adjacent to important border

Table 5.13: Sales Prices for Maize, Sample Households, MK/kg

Sales Price	Mission n=22	Chinteka n=6	Jenda n-=3	Total n=30
Mean	20.5	28.5	30.0	22.6
Std. Deviation	2.6	3.2	0.0	4.6
Median	20.0	30.0	30.0	20.0
Mode	20.0	30.0	30.0	20.0
Minimum	15.0	24.0	30.0	15.0
Maximum	27.0	32.0	30.0	32.0

Source: Fieldwork in three villages conducted by the author May-August 2008
Note: In Mission N = 22 because one household did not remember the price.

crossing areas for maize coming into Malawi from Mozambique; therefore maize prices there reflected the two factors of surplus maize being available in volume in the fairly compressed time period of the maize harvest (also occurring simultaneously across the border in Mozambique), and road distance to larger markets or urban areas. Chinteka and Jenda both reported most prevalent maize prices at MK30 kg; however, sample numbers are low in these two markets due to the lack of sales encountered amongst sample farmers.

Farmers were asked a variety of questions about their sales decisions to traders, and a sample of traders were in turn asked questions about their buying and selling prices and institutional links. It is recalled that it was originally intended to conduct a 'follow-the-bag' marketing research methodology (Chapter 3); however, two factors in practice rendered this idea rather implausible when it came to conducting the research. One of these was the low proportion of farmer interviewees who engaged in market sales in the 2008 harvest season; the other was that even one or two weeks after the harvest, farmers were no longer able to recall the names of traders to whom they had sold their harvest. Indeed, a striking finding of the research that arose from both household and community level interviews was farmers' complete indifference to who they sold their output. In effect, transactions were conducted at arms length with total strangers, with price being the sole feature of interest to the farmers. This is on its own quite an important finding. It is often supposed that very poor small farmers have a preference for selling to relatives and friends with whom they have previously built up a relationship of trust, and which they hope will avoid exploitation by middlemen who know more about true market conditions than the farmers know themselves. However, this was not found to be true at all in this study. The prevalence of anonymous arms length transactions is recognised by economists as an important ingredient of competition in markets and the formation of a 'market price'. In its absence, transactions are personalized and each exchange represents its own individual peculiarities in terms of price setting rather than a reference to the larger domain of the market.

Households in the study villages have various options for marketing their maize: selling at local open markets, direct purchase by buyers at homesteads, depot-delivered at premium price with minimum deliverable quantities at designated depots, and formal contract buying. Due to the collapse of the follow-the-bag methodology, alternate buyers from farmers were interviewed, on the basis of capturing a representative range of different stages and chains in maize marketing. A total of 28 institutions were interviewed in the categories of local maize trader, long distant maize trader, district and national buyer, processor and service provider (government). The majority of buyers interviewed were local maize traders (Table 5.14) directly interfacing with farmers at the local level. The traders, processors and service providers interviewed (Appendix III) were those that were mentioned during the survey and were involved directly with maize marketed from the study villages. Local traders are sometimes referred to here as 'mobile traders'. This is because they do not possess permanent structures or have fixed purchase itineraries. Rather they arrive for a period, set up a weighing scale on a tripod, buy maize while it is on offer, and then move on. In most cases, they come from outside the community (they are unknown mobile traders).

Table 5.14: Categories of Trader Interviewed by the Researcher

Category	**No.**	**%**
Local Maize Trader	11	39.3
Long Distance Maize Trader	8	28.6
District or National Buyer	2	7.1
Food Processing Companies	6	21.4
Public Service Providers	1	3.6
Total	28	100.0

Source: Fieldwork in three villages conducted by the author May-August 2008

In Mission, mobile traders were predominant; while in Chitenka a mixture of mobile and distant traders were present in the village at harvest time. Large scale buyers, for example registered members of the GTPA, typically have agents purchasing on their behalf at village level, and the maize purchased then feeds into a national network at higher levels of aggregation (Figures 5.2 to 5.4 below). Traders from outside dominate in Jenda because it is situated on the M1 road linking the north and the south of Malawi, with a good road infrastructure that attracts long distance buyers. The unknown mobile traders bought maize from 83 per cent of farmers who sold maize in the sampled villages in 2008, followed in importance by ADMARC at 7 per cent.

The prevalence of small, opportunistic traders in the Malawi maize market is important for debates about market functioning, and how important market imperfections are for explaining poor agricultural performance. A key feature of such traders is that they are unregistered, and for this reason they would not appear in any market structure data based on trader registration by the authorities (Chilowa, 1998). Interviews with farmers and traders did not suggest that the bigger players were able to outbid small traders in order to secure more maize, as is suggested by Chirwa (2009). Rather, there are a wide variety of different operators occupying different niches in the primary level marketing function. If larger traders and processors are prepared to pay higher prices, then this just feeds through to the mobile traders, who in turn will end up paying farmers higher prices, too. Mobile traders do not engage in a storage function, except in a minimal way (they might rent a hut for temporary storage overnight, if they have a transport bottleneck). They purchase and sell as soon as they can, creating a margin due to their ability to move rapidly to the next place where sellers are present. The larger operators tend to buy from markets, or from the mobile traders, using purchasing agents, who are again numerous and try to drive a hard bargain in their transactions. The overall picture at village and local market levels is a highly competitive one.

Almost all the buyers and processors interviewed in this study were not registered members of the GTPA. An important exception at the larger end of the scale was Mulli Brothers. The system of registration of private traders that was created in 1988 following liberalisation of the maize market had all but collapsed by 2006, due to an inability to keep up with the spread of small scale trading, and weakening enforcement by MoAFS (Sjaastad *et al.*, 2007 p.20). The government's support of the formation of the GTPA in 2006 represented an attempt to reverse this lack of control by drawing private traders themselves into the enforcement regime. However, this effort was set back seriously in mid-2008 by the sudden decision to exclude private trade from the maize market in August 2008. In general, and especially at local levels, unregistered traders predominate, and this includes agents as well as mobile traders, since agents are no less 'informal' than other small traders, it is merely that in exchange for a fee they agree for a period, or in a particular location, to purchase for a principal rather than on their own account. Fifty per cent of the local maize traders interviewed were buying as agents.

Amongst larger players, ADMARC, Farmers World and Mulli Brothers were the most prevalent large buyers of maize across the study sites. ADMARC was absent in Mission itself, but had a permanent storage structure at Chinteka known as the Kariba ADMARC branch, and in Jenda ADMARC rented two temporary structures during the buying season, that were then closed when volumes traded began to tail off. Jenda differed from the other study villages in having permanent facilities along the main road belonging to a number of different larger scale traders including Export Traders, Farmers World, Mulli Brothers, Kulima Gold, NASFAM and Jenda Market Resource Centre, a local produce buyer.

In the harvest season, buyers operate almost continuously with most of them reporting 6-days a week and a few of them working the full 7-days. It was found in a study written up by Fafchamps and Gabre-Madhin (2006, p.13) that traders operated on average 6.1 days per week in the buying season. In the small sample of traders in this fieldwork, purchases volumes varied between 3 and 55 bags of maize per day, on average, and in the Muloza area (of which Mission village is a part), traders had purchased, again on average, 2,444 bags in the season (these are 50 kg bags of maize grain) per trader. In general, as shown in Table 5.15, there is great heterogeneity in the scale of operations in this small sample of traders. In the three villages, traders interviewed were operating in the scale of over 5,000 bags on average in the season to date. The quantities of maize bought in the Mission-Muloza area seem to far exceed the small quantities of maize sold by local farmers, and this is due to cross-border traffic from Mozambique during the harvest season. FEWSNET estimated that informal cross border trade into Malawi in July 2008 was 15,100 tons of husked maize (FEWSNET, 2008a). This then collapsed to 8,516 tons in August 2008 due to a government ban on private maize trading that was imposed that month. Mozambique was the main supplier of maize, but also in 2008, Malawi imported significant quantities from Zambia towards the end of July 2008.

Table 5.15: Purchase Transactions and Volumes, Sample Traders, 2008 Season

Purchase Transactions	**Mission** n=6	**Chinteka** n=6	**Jenda** n=6	**Total** n=18
HHs purchased from per day	39	24	26	29
HHs purchased from per week.	231	155	179	151
Days trading per week	6.3	6.0	6.3	6.2
Maize bought per day (bags)	325	28	17	188
Maize bought per week (bags)	2,017	182	105	768
Maize bought this season (bags)	14,667	603	337	5,202

Source: Fieldwork in three villages conducted by the Author May-August 2008

5.2.6 Maize Marketing Chains from Sample Villages

The principal maize consumer markets in Malawi are the cities of Lilongwe in the centre of the country, Blantyre in the south, and the somewhat smaller urban area of Mzuzu in the north. In Malawi post-independence history, Blantyre has traditionally been the commercial centre of the country with the most vigorous urban and industrial economy. In 1975, the administrative capital was moved to Lilongwe. In the past ten years or so, Lilongwe has been the fastest growing city, attracting substantial migration from other parts of the country. The population census conducted in 2008 gives Lilongwe city a population of 674,448, with Blantyre at 661,256, Mzuzu 133,968, and Zomba (like Blantyre, in the south) 88,314 people. Much of the border trade with Mozambique that has been discussed in this and the previous chapter is to do with supplying Blantyre, Zomba and other towns in the south with maize. Central Malawi is often more or less self-sufficient in maize. The annual population growth rate for Lilongwe and Mzuzu cities is 4.4 per cent, Zomba city 3.0 percent and Blantyre city 2.8 percent (Government of Malawi, 2008c).

Tracing vertical marketing chains for the study villages is a useful exercise because it helps in identifying clearly the processes of aggregation that occur from the farm level towards the larger traders and processors in the marketing system (including government agencies such as ADMARC and the National Food Reserve Agency (NFRA). Marketing chains are reconstructed on the basis of triangulating evidence from farmer interviews, focus group meetings in villages, and trader interviews conducted during the fieldwork period. The chains are presented in Figures 5.2 to 5.4. These do not attempt to assign maize volumes to the various components of the marketing structure. The picture for Mission village is most complete, since it is here that the greatest number of farmers had sold maize and a great deal of trading activity was taking place at the time of the fieldwork. The following paragraphs describe the findings for each village in turn:

Mission Maize Marketing Chain

The active main maize trading areas close to Mission are Ndala, Nanchidwa and Ntambalika villages that are 7 km from Mission and the larger trading centre of Muloza. Most of the buyers in the sample were full-time buyers, engaged in maize buying for the duration of the harvest season; all were men, buying and selling on their own account. Their mode of transport was bicycle; they paid cash for the maize bought and financed the purchasing from own resources. During the period of the survey, the government had just imposed a ban on maize imports and exports. However, despite the ban a lot of maize was still entering Malawi via informal cross-border traders, with unofficial entry at Mtambalika Village, which is along the Phalombe road. The maize entered Malawi on bicycles, with one bicycle carrying up to four 50 kg bags at once and offloading was every minute with, each collection site mobilising over 30 tons of maize in a day. Large buyers in Blantyre (Rab Processors, Chibuku Products) buy maize from the mobile traders. The ban on maize imports therefore affected buyers in both Blantyre and Muloza. The ban increased the loading time of a 30-ton truck in Muloza from less than a few hours to 24 hours because with the ban meant that maize was carried to the loading point in small volumes by bicycle, rather than by pickup trucks. However, the government lifted the ban on individual maize import volumes of less than a ton within two weeks of putting it in place, thus allowing the open transport of quantities up to the one ton ceiling to proceed as normal. This sudden switching of policy is an important reminder of the unpredictability of government actions on maize, even over quite short time horizons. Figure 5.2 provides a summary of the marketing chain through which the maize in Mission in Mulanje and from Mozambique reaches the processors and consumer in Blantyre and Lilongwe, though the majority of those farmers who sold could not remember the buyers of their maize.

Chinteka Maize Marketing Chain

Few of the sample farm households in Chinteka sold maize in the 2008 season and those that did most were able to name the buyers who bought their maize. From the trader interviews, it transpired that all local buyers were men with one exception. In Chinteka, the majority of small traders were operating in the market as agents for private companies based in Lilongwe. Chinteka had a mixture of full-time and part-time buyers, and most of these were locally resident. The majority of the maize was transported onwards using pickups and trucks, but bicycles were also observed to be an important means of maize transportation within the area. Figure 5.3 summarises the marketing chain as constructed for maize sold in Chinteka.

Figure 5.2: Mission Maize Marketing Chain

Source: Compiled by author from fieldwork in Mission, May 2008

Figure 5.3: Chinteka Maize Marketing Chain

Source: Compiled by author from fieldwork in Mission, June-August 2008

Jenda Maize Marketing Chain

At the time of the fieldwork maize purchases in Jenda relied on supplies from the adjacent Lundazi area of Zambia, purchased at Whynot and Zaya markets. As already noted, several large trading companies have permanent operations located at Jenda due to its convenient position right on the main north-south road, and its access to produce from surrounding rural hinterlands. ADMARC, however, only operates seasonally in Jenda. The two sample households who were maize sellers in Jenda were unable to name their buyers. As for Chinteka, all buyers in Jenda except one were men. Maize trading is an overwhelmingly male occupation in Malawi, as a general rule. Traders in Jenda were full time agents for private sector companies. The mode of transportation used was a mixture of bicycles and pick-ups, with a few larger trucks. Jenda households expressed a preference to sell their maize to ADMARC, because it was thought that the latter would sell maize back to them at reasonable prices in times of food shortage. However, the two households who sold maize did so to mobile traders. Jenda MRC, a franchise of MACE through its produce-bulking services, was the only trader interviewed that was buying at Jenda on its own account rather than for other traders. It was buying mainly from Nkhamenya (30 km from Jenda), and was selling maize to Kulima Gold at Jenda. Jenda MRC financed maize procurement with a loan from National Bank of Malawi. Figure 5.4 summarises the marketing channels through which the maize from Jenda passes from the farmer to the final consumers, mostly in Lilongwe.

Figure 5.4: Jenda Maize Marketing Chain

Source: Compiled by author from fieldwork in Jenda, July-August 2008

5.2.7 Prices and Margins

The original concept of the follow-the-bag methodology, had it worked well, would have yielded data on buying and selling prices of maize in successive stages of the vertical marketing system, allowing the overall margin between the producer and the consumer to be disaggregated into its component parts. Due to a lack of farmers selling maize in the 2008 survey, however, it was not possible to construct margins in quite this way, although Mission village yielded sufficient information at the farmer and local trader level to go quite a long way in this direction, and Chinteka somewhat less so. Interviews with traders at different stages and scales in the marketing system allowed many of the gaps to be filled in, especially in the case of Mission village.

Analysis of price formation through marketing margins has the objective of seeing whether such margins represent a competitive return to capital deployed (Timmer *et al.*, 1983). In the absence of own data on storage costs, the findings of Jayne *et al.* (2008a) were used to estimate costs for the storage component of the vertical margin. In relation to competitive returns to capital, the official bank lending rate is used as a benchmark with which to compare percentage net margins. The National Bank of Malawi lending rate of 19.5 per cent per annum (1.63 per cent per month) in 2008 was used, and some traders confirmed borrowing at this rate. In general, however, it is expected that private borrowing will have occurred above this rate, since commercial suppliers of credit build their own margin into the difference between their borrowing rate from the Reserve Bank of Malawi and their loan rate to private clients.

The analysis of prices and margins for Mission village is presented in Table 5.16. This table begins with an average purchase price from farmers at the top of the first column. This farm-gate price is compared successively to various city prices in other columns, as well as (last column) the official purchase price from farmers set by the government for ADMARC in March 2008. The city prices refer to the prices that various private and public organisations stated that they would pay for maize delivered to their premises. The vertical information in the first column of the table displays various margins, based on information obtained from private traders, for specific purchases and sales. In Mission village farmers received 41-53.9 per cent of the buying prices of various traders in Blantyre, and 73.2 per cent of the official NFRA buying price for maize in Lilongwe. In interpreting this table for the harvest season of 2008, it needs to be borne in mind that Mission harvested early in what subsequently became a crisis season in which prices began to spiral upwards from late July onwards. At the time of the Mission harvest, farmer prices were relatively low. In that period, ADMARC remained free to set its buying prices according to local circumstances, and its prices varied in different parts of the country rather than being pan-territorial. Later in the same harvest season, the

Table 5.16: Sequential Marketing Margins, Mission Village, end-May 2008
(prices and costs in MK/kg)

Transaction	Cost per kg	% of Rab Price Blantyre MK38/kg	% of Chibuku Price Blantyre MK40/kg	% of NFRA Price Lilongwe MK50/kg	% of Retail Price Blantyre MK38.2 /kg	% of Official buying price MK28/kg
(1) Purchase in Mission						
Price paid to farmer	23.50	61.8	58.8	47.0	61.5	83.9
Transport to Nachindwa	1.00					
Price sold at Nanchidwa	26.00	68.4	65.0	52.0	68.1	92.9
Net Margin	1.50	2.6	2.5	2.0	2.6	3.6
Margin %	6.4					
(2) Storage in Nachindwa						
Purchase Price into Store	30.00	78.9	75.0	60.0	78.5	107.1
Period of storage (days)	30.00					
Storage Costs	0.39	1.0	1.0	0.8	1.0	1.4
Onward Sale Price	32.00	84.2	80.0	64.0	83.8	114.3
Net Margin	1.61	4.2	4.0	3.2	4.2	5.8
Margin %	5.4					
(3) Nanchidwa Buyer						
Price Paid	32.00	84.2	80.0	64.0	83.8	114.3
Price Sold to Buyer	33.00	86.8	82.5	66.0	86.4	117.9
Time Taken to Sell (Hrs)	3 to 4					
Net Margin	1.00	2.6	2.5	2.0	2.6	3.6
Margin %	3.1					
(4) Mtambalika Buyer						
Price Paid	33.00	86.8	82.5	66.0	86.4	117.9
Transport to Blantyre	2.00	5.3	5.0	4.0	5.2	7.1
Price sold in Blantyre	37.00	97.4	92.5	74.0	96.9	132.1
Time Taken to Sell (Hrs)	3 to 4					
Net Margin	2.00	5.3	5.0	4.0	5.2	7.1
Margin %	6.1					

Source: Fieldwork in Mission village conducted by the author May 2008, storage and chemical costs for Mulanje (Jayne *et al.,* 2008).
[1] Retail prices are monthly average prices collected by MoAFs retail prices

ADMARC purchase price was raised to MK45, and this was a pan-territorial price, and private traders were banned from purchasing maize from farmers.

The table contains the successive trading margins of three linked buyers at Mission, Nanchidwa and Mtambalika markets respectively. In these stages, the price rose from MK23.5 (paid to farmers in Mission) to MK37 (sale price in Blantyre). Margins after deducting particular costs (storage, transport) vary between 3.1 and 6.4 per cent for each trader. However, these margins do not account for other marketing expenses including losses, nor do they take into account the opportunity cost of capital which can be put at a minimum of 1.63 per cent per month (at the National Bank lending rate). Overall, it seems that traders operate within narrow margins, and the estimated aggregate margin to retail in Blantyre at around 43 per cent is not high for a vertical marketing margin.

For the other villages, it was more difficult to construct this type of marketing chain. This was partly due to the turmoil in the market that began to occur in July 2008. For example, by the time interviews with traders were being conducted in Chinteka village, the price that several Lilongwe traders (Central Poultry, Export Trading) were prepared to pay for maize was MK60 per kg, more than double the official ADMARC price of MK28 per kg. This was just before the ADMARC price was then adjusted upwards to MK45 per kg. In this situation, asking traders about buying and selling prices was something of a moving target. For example, one trader had purchased maize into store in Jenda at MK50 per kg, but after only two weeks was expecting to sell at MK65 kg. In this situation, there is no doubt that private traders can potentially gain excessive profit margins as prices move up. However, traders are merely responding to opportunity created by a real, underlying, shortage of supply. It is unfortunate that governments tend to ascribe spiralling prices to deliberate intent on the part of private trade (or, at least, this is sometimes the message to put across to consumers and voters), because this fails to address the cause of the rising price trend. In particular, a shortage of supply is not solved by banning private trade and inhibiting informal cross-border imports. The thesis returns to this problem of cause and effect in the 2008 maize price crisis in Chapter 6.

5.2.8 Key Informant Interviews with Traders and Processors and Government

In addition to the farmer level household survey and interviews with small and medium traders, key informant interviews were also conducted with larger private trading companies and government agencies involved in the maize market. These included

NFRA, GTPA, ADMARC and Chibuku Products, and this section first briefly outlines the role and activities of these bodies.

The NFRA is the government emergency food stocking agency, and in order to fulfil this function it must buy grain when prices are low, and have stocks available to meet maize shortfalls either for the market as a whole, or in specific areas that turn out to be maize deficit, and that can vary in location from year to year around the country. NFRA typically begins buying maize in July and finishes in November depending on the volume of stock it is seeking to build. NFRA purchases are funded partly from government revenue and also by donors, amongst which the European Union and UK Department for International Development (DFID) are the most important. The maize purchased must meet NFRA maize standards of non genetically-modified white maize from the current production year, with 12.5 per cent maximum moisture content, 3 per cent maximum breakage, 1 per cent shrivelling, 2 per cent maximum grain of other colour, 0.3 per cent maximum extraneous matter and trash, 1 per cent maximum rotten or mouldy grains, 0 per cent maximum germinated grain, 4 per cent maximum aflatoxin, and free of contaminants or live insects. In 2008, NFRA purchase contracts were awarded to ADMARC and several private traders through the GTPA. The purchase of maize from private traders was stated as providing an opportunity to build the capacity of the private sector.

NFRA loses some maize in storage due to moisture loss from further drying, breakage when recycling it from one bin to another, and dust and chaff from broken grain. The maize is stored in bins for a duration that can last as much as 30 months. Losses in store were very high in the late 1990s estimated at 46 per cent in 1999/2000 (NFRA, 2008). Almost certainly this reflected unofficial disposals out of store, since after considerable publicity and a crackdown, the loss purportedly fell to less than 1 per cent in 2007/08, an achievement attributed by the government to applying good maize purchase standards, and improved storage management. NFRA's main role is to distribute maize to food deficit households for humanitarian purposes. However, in 2006 NFRA also started keeping commercial maize stocks, related to the excellent harvest achieved in the 2005/06 season. In 2007, on behalf of the government, NFRA exported some maize to Zimbabwe and donated maize to Lesotho at a time when Malawi had an estimated maize surplus of over 500,000 tons.

The GTPA is an association of private traders, not a direct maize buyer. Its formation was encouraged by the government through MoAFS in order to carry out certain roles that had originally been undertaken by government, but had deteriorated in effectiveness over the years. These included sourcing maize for NFRA, as well as the registration of traders and the issue of produce-buying licenses. GTPA is evidently put in an ambiguous position by these functions, and some important private traders have not joined the association. One of the members of GTPA interviewed was Mulli Brothers. It operates 30 maize-buying points, one in each district, and buys from over 1,000 farmers. Mulli Brothers sell maize to NFRA under contract, as well as to processors such as Blessings Campus, Chibuku Products and Central Poultry.

The research conducted an interview with ADMARC at its Mzimba premises in the north of the country. The Mzimba ADMARC covers an area comprising most of four districts: Rumphi South, Nkhatabay, Nkhotakota and Mzimba itself. The boundary for an ADMARC 'area market' is determined by geographical setting and accessibility. ADMARC buys maize and re-bags it as an agent for NFRA, for commercial sales to the public. Most of the maize bought in Mzimba in 2008 came across the border from Zambia, through Kapopo police post, Ntocha, Kasichi, Edingeni and Engalaweni. Maize bought in Mzimba is transported to ADMARC's Mzuzu Depot for storage. In 2008, ADMARC financed its maize purchases with loans from international as well as local banks. At the time of interview ADMARC was not behaving as a monopoly, and was not using pan-territorial pricing. According to interview, ADMARC started buying as early as it could in the 2008 season, while elsewhere its difficulties have been ascribed to entering the market rather late (Jayne *et al*., 2008a).

Chibuku Products is a large private processor in the Malawi maize marketing system. It purchases maize from April to August every year, mostly from medium-sized traders with whom it has developed long-term business relationships. The company uses the maize to make a cloudy local beer called *chibuku*. Traders deliver the maize to the premises of the company. Another large company, Rab Processors, participates in the maize market horizontally through opening buying points, and vertically through processing. It buys maize from farmers directly through 70 shops called Kulima Gold shops, and at its depots in Lilongwe and Blantyre. The company's main maize suppliers in Jenda included local traders from the area, Jenda MRC, and households in Khosolo and Luwerezi areas that are relatively remote from Jenda. Rab's maize is processed into *likuni phala* (vita meal or nutritious flour) and ordinary maize flour for sale in supermarkets such as Shoprite, People's Trading Centre, Metro and other outlets. The company also sells maize as grain to WFP, NFRA and NGOs like World Vision, Church Action in Relief and Development (CARD), German Technical Cooperation (GTZ) and Mary Mills, all of which buy maize for relief purposes. Theft of maize while in storage and transit was stated as a big problem for the company.

Demand by big formal institutions is a significant factor in the maize market. Blessings Campus in Lilongwe buys maize grain and produces *likuni phala* and maize flour. It distributes the vita meal free to the Ministry of Gender, Child Welfare and Community Services (MGCWCS), Ministry of Disability, the Nkhoma Synod and other organisations dealing with HIV/AIDs. Maize flour is used by Blessings Campus's own institutions: the orphanage village, the hospital and an agricultural school in Dowa district. The company buys maize from farmers as well as from big traders such as Mulli Brothers. When they involve purchases by government and NGO agencies, these deliveries are often using donor funds. It also finances maize production inputs to some farmers through an interlocking arrangement that involves Blessings Campus providing households in Dowa and Kasungu with fertiliser and maize seed on loan repaid at harvest time through sales of maize to it at market prices. One further private company worth mentioning, Central Poultry, buys maize to process into chicken feed for use by the company in the production of broiler chickens and eggs, and feed sales to small-scale local broiler chickens and eggs producers. Another large buyer, Export Trading Company in Lilongwe buys maize directly from farmers through 36 rural buying centres and from traders. It processes maize into maize flour (*ufa*) and *likuni phala*, which it sells to NGOs and other consumers through supermarkets. It also sells maize to the NFRA.

Interviews with market participants centred on price formation in the maize market, the regulatory environment, and what respondents regarded as problems and challenges in the market. Here, the results of these interviews are synthesized in the form of a narrative, rather than being presented on an interview-by-interview basis. In the view of most respondents, maize price formation in Malawi nowadays reflects what is expected of a liberalised market. Maize prices vary within markets, between markets and across seasons, but are continuously adjusting rather than staying in fixed ratios in relation to each other. Unusually wide variation is typically a good indication that the market is for some reason not functioning well in that season. In 2008, most private sector buyers started off treating the ADMARC purchase price as the benchmark in setting their own prices, as was also reported by Jayne *et al.* (2008a, p.18). In general traders set their buying price just above the ADMARC buying price; however, ADMARC retaliated by adjusting its buying price upwards. Interviewees confirmed that until August 2008, ADMARC maize prices varied from area to area depending on the competition.

For the large private sector buyers, price formation at the farmer level involves continuous interaction by mobile phone between local-level agents and district or regional offices. In the view of respondents, the reason that farmers and small traders stopped selling to ADMARC in July 2008 was because the large private operators perceived the direction the market was heading well ahead of public agencies or the government. Moreover, by definition private traders are accustomed to making instantaneous adjustments in the light of emerging market conditions, which public bodies are unable to do. In 2008, both ADMARC and those private sector buyers with institutional contracts used a differentiated approach to maize prices involving the delivery of minimum quantities of maize to designated warehouses at premium prices higher than local markets prices. It was stated by respondents that collusion among buyers on price formation was not feasible due to the incredibly diverse array of different traders in the market, and their varying interest in securing grain for different purposes. Of course traders would talk to each other about the direction they thought the market was going (whether stable, up or down), but this did not in any sense amount to collusion, which would require strict agreement to buy at fixed prices, not evident anywhere in Malawi. Nevertheless, the government invoked collusion as one of its reasons for banning private trade in August 2008 (Jayne *et al.,* 2008a p.5).

On government regulation, respondents affirmed that although agricultural marketing was liberalised, they still had to conform to government business regulations including licenses. The Ministry of Trade and Private Sector Development administers the licensing of all businesses in Malawi under Chapter 46 of the Business Licensing Act. However, the Ministry delegates the licensing of small local indigenous businesses to the district assemblies, and MoAFS is responsible for issuing buying licenses for agricultural produce. The produce-buying license, which was reintroduced in March 2008 by MoAFS, was issued under the provisions of the Agriculture (General Purposes) Act, 1997 and the Smallholder Agricultural Produce (Marketing) Regulations of 1987.

There was a lot of discussion about the August 2008 ban on private trade, imports and exports. Some of the private sector interpreted the ban as the government making private maize trading an unwanted (even illegal) activity. Some private sector respondents also emphasized that the ban on maize imports contributed to rising maize prices as it created widespread anxiety regarding the sufficiency of maize supplies in the country. The major worry of processors interviewed was the failure of communication regarding regulatory changes between the government and the private sector. The private sector heard about policy changes through the radio. The private sector would prefer to have adequate notice of such extreme changes so that they can adjust operations to avoid costs such as charges by owners of trucks for holding their trucks at the borders when they are caught up in new policy prohibitions while in transit. More consistent government policy statements and commitment to a stable long-term policy environment would enhance private sector participation in markets, and reduce hurting of the private sector because of sudden policy reversals (refer discussion in Chapter 2 above and especially Jayne *et al.,* 2002; 2006).

The maize market is also subject to three types of taxation: a withholding tax, a surtax and a corporate tax. Withholding tax is charged at 7 per cent on maize sales of more than MK60,000 and is paid at the point of purchase, with the buyer deducting it from the seller's proceeds on behalf of the Malawi Revenue Authority (MRA), the institution responsible for tax collection on behalf of the government. Surtax is charged on processed maize products only. Large companies are also subjected to corporate tax by the MRA at 30 per cent of profits. Turning to the issue of how difficult it is to start a maize trading business, the private sector view was that it was easy enough to do, but surviving unpredictable changes in policy could make the early years after start-up high risk. The established operators have learnt from experience the way the government tends to respond to crisis events, and therefore is able to anticipate some of the effects. Before the August 2008 ban on private maize trading there were no restrictions on anyone's entering maize marketing and trading, subject to having access to sufficient financial resources to undertake buying and selling.

In March 2008, MoAFS set a maximum maize buying price from farmers of MK28 per kg, and the logic of this was publicised by the government as being to do with discouraging farmers from selling too large a proportion of their maize, and leaving themselves with insufficient supplies at household level. This suggests that even as early as March, some in government envisaged a short supply situation might develop, even though official predictions were for a bumper harvest (discussion in Chapter 3 refers). It was also a departure from previous practice throughout the 1980s and 1990s, when securing a minimum harvest price for smallholder farmers was the government priority (Harrigan, 2003). That the majority of the poor smallholder farmers are also net maize buyers is not in dispute (Government of Malawi, 2005a; Chirwa 2009), however, the idea that a maximum buying price would encourage greater crop retention by farmers is an unorthodox one, the economic logic of which is rather doubtful. In the event, the government failed anyway to defend the maximum buying price, and prices rose inexorably from July onwards to reach a record level in nominal terms of MK68 in Limbe by the end of the year in December (further examination of the price rise in 2008-09 is provided in Chapter 6).

Most of the traders interviewed at various levels in the marketing chain stated that they experienced a buoyant maize market in 2008, indicated especially by their preparedness to increase the number of buying points that they maintained in rural areas during the harvesting season. As already discussed in other contexts, part of this buoyancy occurred due to competition between the public and private sectors for supplies in a market that turned out not to be as over-supplied as indicated by the government maize production estimates. In particular, NFRA was trying to build stocks early in the harvest period, providing an important outlet for maize procured by private traders, and ADMARC was in the market trying to procure maize both for the NFRA and to rebuild its own stocks.

Interviews with traders on problems of maize marketing in Malawi involved prioritization of a list of maize marketing problems that had already been identified in pre-testing. Each trader who was interviewed ranked the problems individually, and the prioritisation yielded the following list in descending order of importance: achieving good sales prices, finding buyers, inadequate storage capacity, lack of transport, poor quality of crop purchased from farmers, loss of crop in storage, poor rural roads, difficulty of securing credit, use of inaccurate weighing scales, and theft. Other agricultural marketing problems mentioned included lack of use of grades and standards, poor security in rural areas, and inconsistent government policy. These problems are consistent with the ‘weak private markets’ view of staple food marketing in eastern and southern Africa (Dorward *et al.*, 2009a; 2009b, and also see discussion in Chapter 2 above).

The category 'finding buyers' was also encountered in discussions with farmers about marketing problems, and is difficult to interpret. The problem is not so much a lack of individuals or enterprises with whom transactions can be carried out, but rather a lack of confidence that the best price (or the desired price) can be secured in the deal. In other words the complaint about 'finding buyers' is more akin to a trader saying 'it would be nice to get a guaranteed high price ensuring my profit margin' than to a true statement about the lack of buyers and sellers in the market. Many traders prioritised insufficient storage capacity as a serious problem, especially at more aggregate stages of the marketing chain between small buyers at farmer level and large scale purchases by formal sector trading enterprises.

The marketing problems that attracted most discussion with private traders can be grouped as done in the following list:

(a) theft in storage and in transit, part of a broader problem of growing lack of security in some rural areas;
(b) lack of grades and standards, so that most transactions, especially at the local level, depend on the visual inspection of maize, with high risks for buyers that price bargains do not represent the true quality of the produce purchased;
(c) inconsistent and unpredictable government maize policy, as manifested especially in 2008 with the sudden decision to ban private trade in maize and prohibit imports;
(d) lack of access to credit on reasonable terms, an essential requirement for traders of all sizes, and a constraint to the pace of the growth in trader numbers and participants in the market;
(e) the generally very low volume of maize supply from individual sellers at local level increases the transaction costs of procurement for larger traders further up the system (also cited as a significant issue by Jayne *et al.*, 2008a p.17).

The main reason given by the government for intervening in the maize market through ADMARC and NFRA was the inability of the private sector to provide maize to consumers at competitive prices reflecting the underlying marketing costs. This reasoning has resulted in frequent changes in direction by the government regarding the status of ADMARC as a market player. At times since the start of market liberalisation, the role of ADMARC has been severely downgraded, even becoming a residual and minor force in Malawi maize marketing. At other times, especially when supply shortages have caused rising prices, ADMARC has been resurrected and given special powers over supply and prices. In August 2008, as we have seen, this was taken to an extreme with the issue of the directive that made ADMARC the monopoly buyer and seller of maize for the first time in 21 years.

Despite the private sector being generally found to be efficient in maize storage (e.g. Myers, 2008), they are faced with constraints of available storage facilities, especially at larger scale. ADMARC still owns most of the crop storage capacity in Malawi, and historically has not necessarily made this capacity available to the private sector, even during periods when ADMARC itself has been playing a relatively small role in the market. This problem has been addressed recently by the establishment in April 2009 of the Malawi Agricultural Warehousing and Trading Company (MAWTCO), a public limited liability company incorporated under the Companies Act whose responsibility is to enhance agricultural marketing efficiency and transparency for the benefit of farmers by providing traders, processors and other stakeholders with reliable and well-maintained storage services. Under this arrangement, ADMARC is expected to pass on excess warehouse space in and around urban centres to MAWTCO that in turn would lease to the private sector (Jayne *et al.,* 2008a p.4). It remains to be seen, however, whether MAWTCO is successful in achieving this objective, and in particular, whether it will make ADMARC storage capacity routinely and predictably available for rent to the private sector.

5.3 Spatial Integration in the Maize Market

The method of cointegration for examining whether prices in different markets adjust to each other was discussed in Chapter 3 (Section 3.7.2) above. The purpose of the method is to examine if prices of geographically separate markets are systematically related to each other in the long-run and to understand the dynamics of how these prices adjust in the short-run.

The analysis was done for 13 maize markets in Malawi (listed in Table 5.17 below). These are the same markets as those used to examine differences in seasonality in Chapter 4, with the addition of Karonga, Nkhotakota and Luncheza markets. The data covered the period 1989-2009 for the 13 markets providing 3,276 data points. From these 478 missing values were replaced using exponential smoothing (the statistical software Stata was used for this and for the whole cointegration analysis).

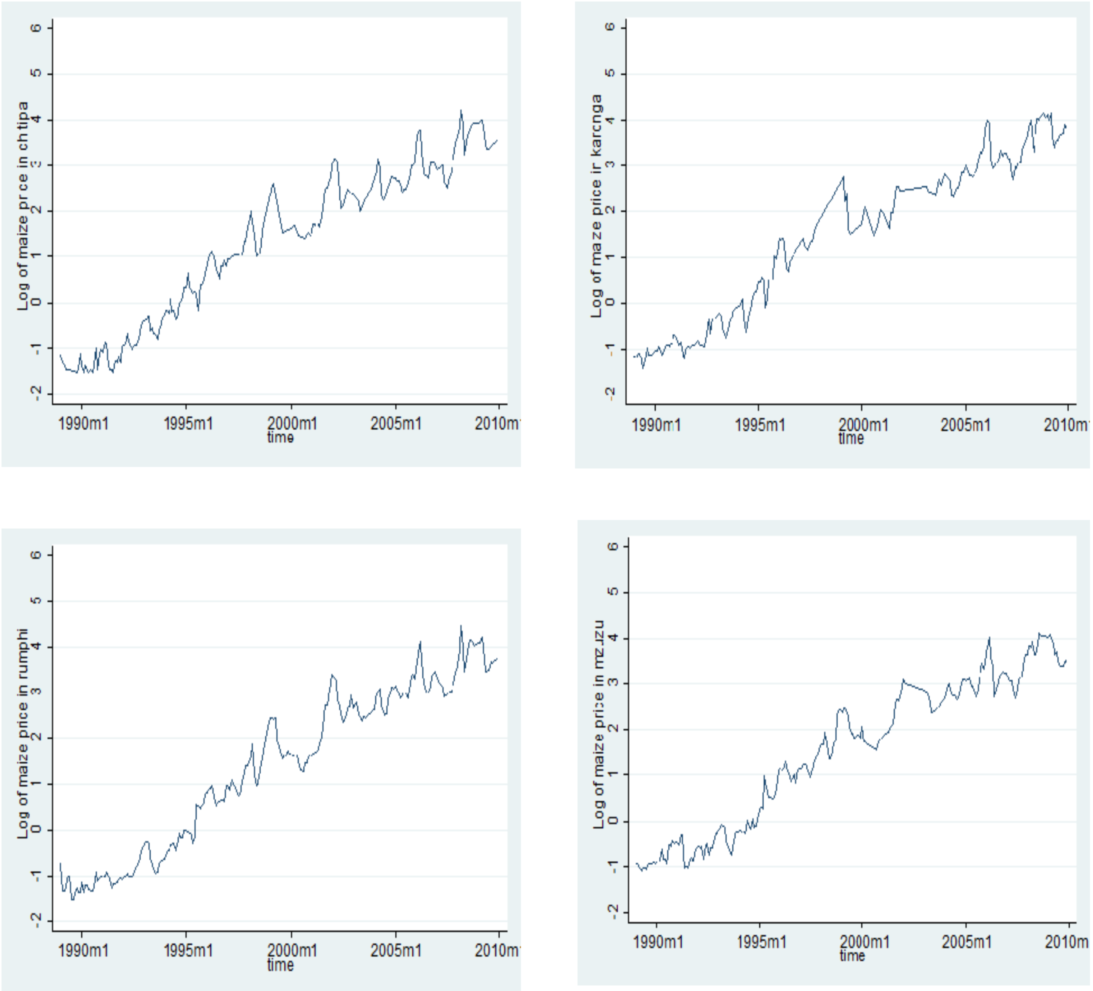
Table 5.17: Dickey-Fuller Test Applied to Price Data in 13 Malawi Maize Markets (1989-2009):

Name of Market	No of Observations	Test Statistics	1% Critical Value	5 % Critical Value	10% Critical Value
Chitipa	207	0.306	-2.586	-1.950	-1.617
Karonga	182	-0.055	-2.589	-1.950	-1.615
Rumphi	214	-0.245	-2.585	-1.950	-1.618
Mzuzu	225	0.255	-2.583	-1.950	-1.618
Nkhotakota	209	0.254	-2.585	-1.950	-1.617
Lilongwe	193	0.405	-2.588	-1.950	-1.616
Mitundu	249	-0.216	-2.580	-1.950	-1.620
Chimbiya	230	0.382	-2.583	-1.950	-1.619
Lizulu	242	-0.095	-2.581	-1.950	-1.619
Lunzu	217	0.113	-2.584	-1.950	-1.618
Blantyre	132	0.047	-2.596	-1.950	-1.612
Luncheza	165	-0.486	-2.591	-1.950	-1.614
Bangula	177	0.003	-2.590	-1.950	-1.615

Source: Price data is from MoAFS

The first step in the analysis is to test whether the maize prices are stationary or non-stationary. The graphs of maize prices in the different markets, grouped by region, are given in Figures 5.5 -7; the overall pattern of prices imply that they are non-stationary. The formal test of non-stationarity was conducted using the Dickey-Fuller unit root test. The null hypothesis (H0) in this test is that the price series are non-stationary (have unit root). The results in Table 5.17 demonstrate that all market price series are non-stationary; the test statistics all fall within the region for accepting the null hypothesis at all the critical values.

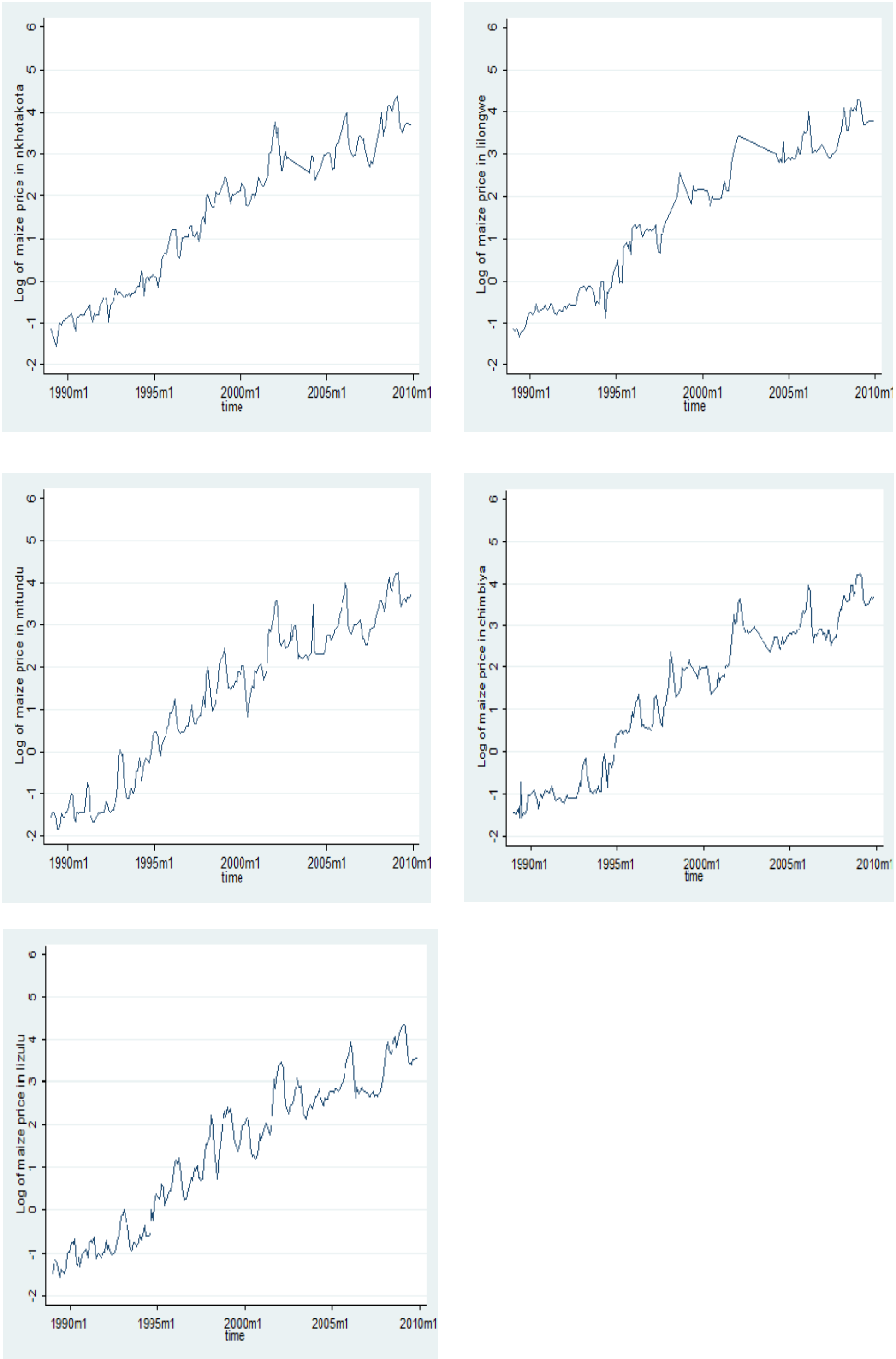
Figure 5.5: North Markets Price Timeline Trends



Source: computations based on MoAFS monthly maize prices

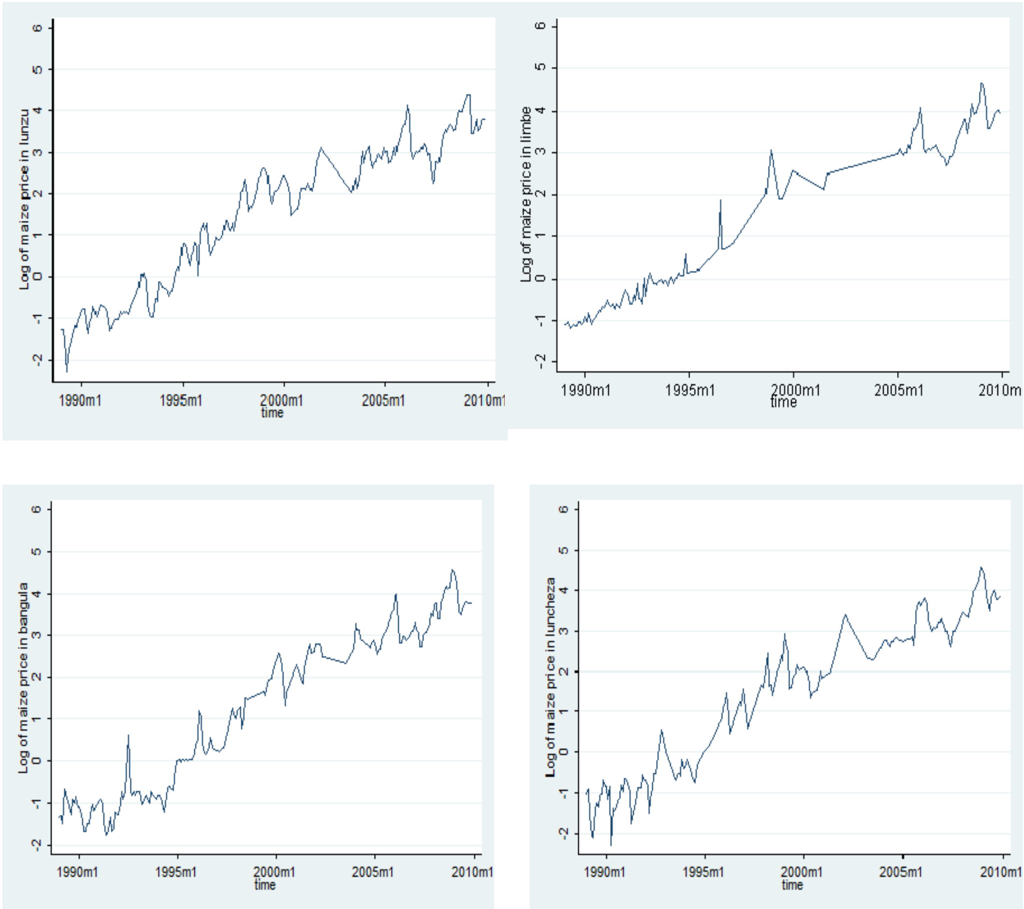
Since the maize prices are non-stationary series, a simple regression is bound to be spurious unless the series are cointegrated. First, we test whether the 13 maize price series are cointegrated using Johansen's test for cointegration. Before testing for cointegration, the appropriate lag for the underlying vector autoregressive model (VAR) was selected using different information criteria (like Hannan–Quinn information criterion (HQIC), Schwarz–Bayesian information criterion (SBIC), final prediction error (FPE), Akaike information criterion (AIC), and likelihood ratio (LR)).

Figure 5.6: Centre Markets Price Timeline Trends



Source: computations based on MoAFS monthly maize prices

Figure 5.7: South Markets Price Timeline Trends



Source: computations based on MoAFS monthly maize prices

A time lag of 4 months, which was the longest lag, was identified. Applying the Johansen tests for cointegration to all the 13 markets no cointegration was found (Table 5.18). The results therefore suggest that all the price series data taken together at the same time are not cointegrated; hence it is necessary to look at cointegration for subsets of prices.

The price data from the 13 markets were therefore divided into three groups by region as follows: (i) north (Mzuzu main market with Chitipa, Karonga and Rumphi), (ii) centre (Lilongwe main market with Mitundu, Chimbiya, Lizulu and Nkhotakota), and (iii) south (Limbe main market with Lunzu, Bangula and Lunchenza). Following the same procedure, the lag and rank of cointegration were identified for each region (Table 5.19).

Table 5.18: Multivariate Johansen Test for Cointegration - Lag selection tests

Maximum rank	Eigenvalue	Trace Statistics	5% Critical Value	SBIC	HOIC	AIC
0	.	535.172*	.	0.180*	-4.221*	-7.187
1	0.284	452.229	.	0.402	-4.211	-7.319
2	0.252	380.246	277.71	0.623	-4.185	-7.424
3	0.238	312.946	233.13	0.818	-4.167	-7.526
4	0.226	249.434	192.89	0.985	-4.162	-7.629
5	0.200	194.073	156	1.139	-4.151	-7.715
6	0.185	143.241	124.24	1.268	-4.149	-7.799
7	0.145	104.487	94.15	1.400	-4.126	-7.851
8	0.122	72.245	68.52	1.515	-4.105	-7.892
9	0.106	44.493	47.21	1.603	-4.093	-7.931
10	0.074	25.374	29.68	1.682	-4.074	-7.952
11	0.057	10.723	15.41	1.734	-4.064	-7.971
12	0.040	0.565	3.76	1.760	-4.064	-7.987
13	0.002			1.779	4.052	-7.982

Source: MoAFS monthly price data

Table 5.19: Time Lags and Rank of Cointegration

Variable	North Markets	Centre Markets	South Markets	All Markets
Time Lag	2	4	2	4
Rank of cointegration	3	4	3	0

Notes:
(1) Time lag for north, centre and south markets was selected by LR, FPE, AIC, while the centre and all markets together the time lag was selected by LR.
(2) Integration order for north, centre and south and all markets together was selected by the three selection criteria - trace statistic, SBIC, and HQIC

The estimation of the vector error-correction models and the cointegrating equations was undertaken. The vector error-correction models capture the short-run dynamics while the cointegrating equation estimates the long run equilibrium relationship (StataCorp LP, 2009). The results of the long run equilibrium relationship are presented in Tables 5.20, 5.21, and 5.22 one for each regional group of markets.

The results suggest the existence of a long-run equilibrium relationship between monthly maize prices of the different markets as evidenced by the highly significant (all significant at 1% level) coefficients of the cointegration equations for all the three regions. As can be seen from the value of the coefficients, there are strong long-term relationships between the prices, a one unit change in price in a market in most cases bringing about also an almost equivalent change in prices in other markets. The least cointegration coefficient is between Limbe and Bangula in the south where a one (log) unit change in Limbe is accompanied by a 0.90 change in Bangula. The cointegration equations capture long run equilibrium. The existence of this long term relationship

Table 5.20: North Markets Long Run Equilibrium Relationships

Market	Coef	Std.Err	z	p > P>|z|	95% Confidence interval range	
_ce1						
Mzuzu	1	.	.	.	.	
Chitipa	-2.78e-17	.	.	.	.	
Karonga	-2.78e-17	.	.	.	.	
Rumphi	-0.9149	0.0115	-79.26	0.000	-0.9376	-0.8923
-cons	-.2600	.	.	.	.	
_ce2						
Mzuzu	(Omitted)					
Chitipa	1	.	.	.	.	
Karonga	(Omitted)					
Rumphi	-0.9521	0.0184	-51.76	0.000	-0.9881	-0.9160
a-cons	-0.0209	.	.	.	.	
_ce3						
Mzuzu	(Omitted)					
Chitipa	1.11e-16	.	.	.	.	
Karonga	1	.	.	.	.	
Rumphi	-0.9283	0.0192	-48.40	0.000	-0.9659	-0.8907
-cons	-0.1664	.	.	.	.	

Source: MoAFS monthly price data

Table 5.21: Centre Markets Long Run Equilibrium Relationships

Market	Coef	Std.Err	z	p > P>|z|	95% Confidence interval range	
_cel						
Lilongwe	1	.	.	.	.	
Nkhotakota	-1.11e-16	.	.	.	.	
Mitundu	-5.55e-17	.	.	.	.	
Chimbiya	(Omitted)					
Lizulu	-1.0004	0.0274	-36.53	0.000	-1.054	-0.9468
– cons	-0.3350	.	.	.	.	
_ce2						
Lilongwe	-5.55e-17	.	.	.	.	
Nkhotakota	1	.	.	.	.	
Mitundu	(Omitted)					
Chimbiya	(Omitted)					
Lizulu	-0.9771	0.0197	-49.59	0.000	-1.0157	-0.9385
-cons	-0.2609	.	.	.	.	
_ce3						
Lilongwe	-2.78e-17	.	.	.	.	
Nkhotakota	-5.55e-17	.	.	.	.	
Mitundu	1	.	.	.	.	
Chimbiya	(Omitted)					
Lizulu	-1.0541	0.0190	-55.34	0.000	-1.0914	-1.0168
cons	0.1891	.	.	.	.	
_ce4						
Lilongwe	-1.25e-16	.	.	.	.	
Nkhotakota	2.78e-17	.	.	.	.	
Mitundu	-6.94e-17	.	.	.	.	
Chimbiya	1	.	.	.	.	
Lizulu	-1.0309	0.0150	-68.82	0.000	-1.0602	-1.0015
-cons	0.0454	.	.	.	.	

Note: The cointegration coefficients indicate by how much maize prices in the long run change in the second market when they change by one (log) unit in the first market.

Source: statistical analysis based on MoAFS monthly maize price data

Table 5.22: South Markets Long Run Equilibrium Relationships

Market	Coef	Std.Err	z	p > P>|z|	95% Confidence interval range	
_ce1						
Limbe	1	.	.	.	.	
Lunzu	-5.55e-17	.	.	.	.	
Luchenza	(Omitted)					
Bangula	-0.8987	0.0416	-21.59	0.000	-0.9802	-0.8171
-cons	-0.3691	.	.	.	.	
_ce2						
Limbe	(Omitted)					
Lunzu	1	.	.	.	.	
Luchenza	(Omitted)					
Bangula	-0.9267	0.0440	21.07	0.000	-1.0129	-0.8405
-cons	-0.3411	.	.	.	.	
_ce3						
Limbe	(Omitted)					
Lunzu	(Omitted)					
Luchenza	1	.	.	.	.	
Bangula	-0.9470	0.0426	-22.25	0.000	-1.0304	-0.8635
-cons	-0.2729	.	.	.	.	

Source: MoAFS monthly price data

doesn't mean that prices will always be in equilibrium even in the short run. To capture the short-term dynamics, error correction models are also estimated. As indicated in Section 3.7.2, the error correction model captures how deviations from long-term equilibrium are corrected. In addition, the error correction model captures how changes in prices of maize in a market are correlated to its own lagged price changes and the price changes of other towns. The main results from the error correction models are summarised below.

Markets in the North

<u>Mzuzu market</u>: Price changes in Mzuzu market are significantly affected in the short-run when the Mzuzu-Rumphi and Karonga-Rumphi markets are out of long-term equilibrium; in contrast, disequilibrium in Chitipa-Rumphi does not significantly change prices in Mzuzu. For example, a 1 unit deviation from long-term equilibrium in Mzuzu-Rumphi and Karonga-Rumphi markets change Mzuzu price by -0.21 and 0.18

respectively. The results also suggest that the price change in Mzuzu is significantly affected by price changes in Rumphi market one month ago but is not affected by lagged price changes in the other town including Mzuzu itself (Table 5.23).

Chitipa market: Price changes in Chitipa market are significantly affected in the short-run when the Chitipa-Rumphi and Karonga-Rumphi markets are out of long-term equilibrium; in contrast, disequilibrium in Mzuzu-Rumphi does not significantly change prices in Chitipa. For example, a 1 unit deviation from long-term equilibrium in Chitipa-Rumphi and Karonga-Rumphi markets change Chitipa price by -0.35 and 0.25 respectively. The results also suggest that the price change in Chitipa is not significantly affected by any lag price changes.

Karonga market: Price changes in Karonga market are significantly affected in the short-run when the Mzuzu-Rumphi and Karonga-Rumphi markets are out of long-term equilibrium; in contrast, disequilibrium in Chitipa-Rumphi does not significantly change prices in Karonga. For example a 1 unit deviation from long-term equilibrium in Mzuzu-Rumphi and Karonga-Rumphi markets change Karonga price by 0.16 and -0.12 respectively. The results also suggest that the price change in Karonga is not significantly affected by any lag price changes.

Rumphi market: statistically significant adjustment parameters are observed for Mzuzu-Rumphi with 0.34 and Karonga-Rumphi with 0.12. The results also suggest that the price change in Rumphi is significantly correlated to one month lagged maize price changes in Chitipa, Karonga and Rumphi.

Markets in the Centre

Lilongwe market: statistically significant adjustment parameters are observed for Lilongwe–Lizulu with -0.24 and Chimbiya-Lizulu with 0.27 meaning that for a unit deviation from long-run equilibrium Lilongwe prices decline by 24 per cent (the corresponding figures for Chimbiya-Lizulu being 27 per cent increase). The results also suggest that maize prices changes in Lilongwe market are affected by maize price changes in Lilongwe market one month and three months ago, Mitundu market maize price changes one month ago, Chimbiya maize price changes one months, two months

Table 5.23: North Malawi Maize Markets Short Run Market Dynamics

Market	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
Change in Mzuzu price						
_ce1 L1	-0.2076	0.0597	-3.48	0.001	-0.3246	-0.0906
_ce2 L1	0.0041	0.0492	0.08	0.934	-0.0923	0.1004
_ce3 L1	0.1765	0.0460	3.83	0.000	0.0862	0.2667
Lagged own prices						
Mzuzu LD	-0.0517	0,0694	-0.75	0.456	-0.1876	0.0842
Lagged other markets						
Chitipa LD	0.0914	0.0604	1.51	0.130	-0.0270	0.2097
Karonga LD	0.0229	0.0602	0.38	0.704	-0.0952	0.1409
Rumphi LD	0.1735	0.0655	2.65	0.008	0.0450	0.3019
_cons	0.0144	0.0095	1.52	0.128	-0.0042	0.0330
Change in Chitipa price						
_ce1 L1	0.0875	0.0748	1.17	0.242	-0.0592	0.2342
_ce2 L1	-0.3463	0.0616	-5.62	0.000	-0.4672	-0.2255
_ce3 L1	0.2515	0.0577	4.36	0.000	0.1383	0.3646
Lagged own prices						
Chitipa LD	0.0739	0.0757	0.98	0.329	-0.0745	0.2222
Lagged other markets						
Mzuzu LD	0.0473	0.0870	0.54	0.586	-0.1231	0.2178
Karonga LD	0.050	0.0755	0.66	0.508	-0.0980	0.1980
Rumphi LD	0.115	0.0821	1.40	0.162	-0.0461	0.2760
_cons	-0.0032	0.0119	-0.27	0.788	-0.0265	0.0201
Change in Karonga price						
_ce1 L1	0.1624	0.0790	2.05	0.040	0.0075	0.3174
_ce2 L1	-0.0711	0.0651	-1.09	0.275	-0.1987	.0565
_ce3 L1	-0.1205	0.0610	-1.98	0.048	-0.2400	-0.0009
Lagged own prices						
Karonga LD	0.0528	0.0798	0.66	0.508	-0.1035	0.2092
Lagged other markets						
Mzuzu LD	- .145814	.0918457	-1.59	0.112	0.3258	0.0342
Chitipa LD	0.0788	0.08	0.99	0.324	-0.0779	0.2355
Rumphi LD	0.0296	0.0868	0.34	0.733	-0.1405	0.1997
_cons	0.0163	0.0126	1.30	0.194	-0.0083	0.041
Change in Rumphi price						
_ce1 L1	0.3417	0.0683	5.00	0.000	0.2078	0.4755
_ce2 L1	-0.0021	0.0562	-0.04	0.970	-0.1123	0.1081
_ce3 L1	0.1222	0.0527	2.32	0.020	0.0189	0.2254
Lagged own prices						
Rumphi LD	0.1271	0.075	1.70	0.090	-0.0198	0.2741
Lagged other markets						
Mzuzu LD	-0.1002	0.0793	-1.26	0.207	-0.2557	0.0553
Chitipa LD	0.1496	0.0691	2.17	0.030	0.0142	0.2849
Karonga LD	0.1706	0.0689	2.48	0.013	0.0355	0.3056
Rumphi LD	0.1271	0.0750	1.70	0.090	-0.0198	0.2741
_cons	0.0018	0.0109	0.17	0.87	-0.0195	0.0231

Source: computations based on MoAFS monthly maize prices and three months ago, and Lizulu market maize price changes one month and two months ago (Table 5.24).

Table 5.24: Centre Malawi Maize Markets Short Run Market Dynamics

Market	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
Change in Lilongwe prices						
_ce1 L1	-0.2420	0.0477	-5.08	0.000	-0.3355	-0.1486
_ce2 L1	0.0085	0.0648	0.13	0.896	-0.1185	0.1355
_ce3 L1	0.0356	0.0671	0.53	0.60	0.0959	0.1671
_ce4 L1	0.2666	0.0723	3.69	0.000	0.1250	0.4083
Lagged own prices						
Lilongwe LD	-0.1802	0.0682	-2.64	0.008	-0.3139	-0.0465
L2D	0.0099	0.0680	0.14	0.885	-0.1235	0.1432
L3D	-0.1151	0.0629	-1.83	0.067	-0.2384	0.0081
Lagged other markets						
Nkhotakota						
LD	0.1271	0.0783	1.62	0.104	-0.0263	0.2806
L2D	0.0575	0.0738	0.78	0.436	-0.0871	0.2020
L3D	0.0191	0.0717	0.27	0.790	0.1214	0.1595
Mitundu						
LD	0.1376	0.0694	1.98	0.047	0.0016	0.2736
L2D	-0.0197	0.0657	-0.30	0.764	-0.1486	0.1091
L3D	-0.0700	0.0602	-1.16	0.244	-0.188	0.0479
Chimbiya						
LD	-0.2665	0.0756	-3.52	0.000	-0.4147	-0.1182
L2D	-0.2985	0.0699	-4.27	0.000	-0.4355	-0.1615
L3D	-0.1881	0.0628	-3.00	0.003	-0.3111	-0.0651
Lizulu						
LD	0.2562	0.0810	3.16	0.002	0.0974	0.4150
L2D	0.2419	0.0797	3.03	0.002	0.0857	0.3981
L3D	0.0745	0.0694	1.07	0.283	-0.0615	0.2104
_cons	0.0074	0.0108	0.69	0.492	-0.0138	0.0286

Change in Nkhotakota prices	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**95% Conf. Interval**	
_ce1 L1	0.0351	0.0509	0.69	0.490	-0.0646	0.1347924
_ce2 L1	-0.2714	0.0691	-3.93	0.000	-0.4069	-0.1359
_ce3 L1	0.0478	0.0716	0.67	0.504	-0.0925	0.1881
_ce4 L1	0.1586	0.0771	2.06	0.040	0.0075	0.3097
Lagged own prices						
LD	0.0844	0.0835	1.01	0.312	0.0793	0.2481
L2D	-0.1225	0.0787	-1.56	0.120	-0.27679	0.0317
L3D	-0.0067	0.0765	-0.09	0.930	-0.1565	0.1432
Lagged other markets						
Lilongwe						
LD	0.0756	0.0728	1.04	0.299	-0.0671	0.2182
L2D	0.0307	0.0726	0.42	0.672	-0.1116	0.1729
L3D	-0.0291	0.0671	-0.43	0.665	-0.1605	0.1024
Mitundu						
LD	0.1343	0.0740	1.82	0.069	-0.0107	0.2794
L2D	-0.0284	0.0701	-0.40	0.686	-0.1658	0.1090
L3D	-0.0529	0.0642	-0.82	0.410	-0.17878	0.0729
Chimbiya						
LD	-0.1179	0.0807	-1.46	0.144	-0.2760	0.0402
L2D	-0.0715	0.0746	-0.96	0.338	-0.2176	0.0746
L3D	-0.0948	0.0670	-1.42	0.157	-0.2260	0.0364
Lizulu						
LD	0.2006	0.0864	2.32	0.020	0.0312	0.3700
L2D	0.0189	0.0850	0.22	0.824	-0.1478	0.1855
L3D	0.0222	0.0740	0.30	0.764	-0.1228	0.1673
_cons	0.0154	0.0115	1.33	0.183	-0.0072	0.0380

Change in Mitundu prices	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
_ce1 L1	-0.0154	0.0659	-0.23	0.815	-0.1446	0.1138
_ce2 L1	0.2218	0.0896	2.48	0.013	0.0462	0.3974
_ce3L1	-0.3211	0.0928	-3.46	0.001	-0.5029	-0.1393
_ce4L1	0.0941	0.1000	0.94	0.346	-0.1018	0.2899
Lagged own prices						
LD	0.1481	0.0959	1.54	0.123	-0.0399	0.3361
L2D	-0.0820	0.0909	-0.90	0.367	-0.2601	0.0961
L3D	-0.1325	0.0832	-1.59	0.111	-0.2956	0.0305
Lagged other markets						
Lilongwe						
LD	-0.0161	0.0943	-0.17	0.864	-0.2010	0.1687
L2D	0.0014	0.0941	0.01	0.989	-0.1830	0.1857
L3D	0.0949	0.0869	1.09	0.275	-0.0755	0.2653
Nkhotakota						
LD	0.0526	0.1082	0.49	0.627	-0.1595	0.2647
L2D	-0.2471	0.1020	-2.42	0.015	-0.4469	-0.0472
L3D	-0.0981	0.0991	-0.99	0.322	-0.2923	0.0961
Chimbiya						
LD	-0.0793	0.1046	-0.76	0.448	-0.2842	0.1257
L2D	-0.0465	0.0966	-0.48	0.630	-0.2359	0.1429
L3D	-0.1442	0.0868	-1.66	0.097	-0.3143	0.0259
Lizulu						
LD	0.3489	0.1120	3.11	0.002	0.1293	0.5685
L2D	0.2198	0.1102	2.00	0.046	0.0039	0.4358
L3D	0.1694	0.0959	1.77	0.077	-0.0185	0.3574
_cons	0.0207	0.0149	1.39	0.166	-0.0086	0.0500

Change in Chimbiya prices	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**95% Conf. Interval**	
_ce1 L1	0.0501	0.0558	0.90	0.370	-0.0593	0.1595
_ce2 L1	-0.0481	0.0759	-0.63	0.526	-0.1968	0.1006
_ce3 L1	0.1992	0.0785	2.54	0.011	0.0452	0.3531
_ce4 L1	-0.3383	0.0846	-4.00	0.000	-0.5041	-0.1724
Lagged own prices						
LD	-0.1042	0.0885	-1.18	0.239	-0.2778	0.0693
L2D	-0.0799	0.0818	-0.98	0.329	-0.2402	0.0805
L3D	-0.1137	0.0735	-1.55	0.122	-0.2577	0.0304
Lagged other markets						
Lilongwe						
LD	0.1119	0.0799	1.40	0.161	-0.0446	0.2685
L2D	-0.0198	0.0796	-0.25	0.804	-0.1759	0.1363
L3D	0.0413	0.0736	0.56	0.575	-0.1030	0.1856
Nkhotakota						
LD	0.1515	0.0916	1.65	0.098	-0.0281	0.3311
L2D	-0.1593	0.0864	-1.84	0.065	-0.3286	0.0099
L3D	0.1165	0.0839	1.39	0.165	-0.0480	0.2809
Mitundu						
LD	0.0915	0.0812	1.13	0.260	-0.0677	0.2507
L2D	-0.0550	0.0769	-0.72	0.474	-0.2058	0.0958
L3D	-0.0487	0.0704	-0.69	0.490	-0.1867	0.0893
Lizulu						
LD	0.1861	0.0949	1.96	0.050	0.0002	0.3720
L2D	0.0859	0.0933	0.92	0.357	-0.0969	0.2688
L3D	0.0562	0.0812	0.69	0.489	-0.1030	0.2153
_cons	0.0228	0.0127	1.80	0.071	-0.0020	0.0476

Change in Lizulu prices	Coef.	Std. Err.	z	P>|z|	95% Conf. Interval	
_ce1 L1	0.0459	0.0506	0.91	0.364	-0.0532	0.1450
_ce2 L1	0.0647	0.0687	0.94	0.346	-0.0700	0.1994
_ce3 L1	0.1169	0.0711	1.64	0.100	-0.0225	0.2563
_ce4 L1	0.1436	0.0766	1.87	0.061	-0.0066	0.2938
Lagged own prices						
LD	0.1796	0.0859	2.09	0.037	0.0112	0.3480
L2D	0.2085	0.0845	2.47	0.014	0.0429	0.3742
L3D	0.1075	0.0735	1.46	0.144	-0.0366	0.2517
Lagged other markets						
Lilongwe						
LD	-0.0605	0.0723	-0.84	0.403	-0.2022	0.0813
L2D	0.0291	0.0721	0.40	0.687	-0.1123	0.1705
L3D	0.1272	0.0667	1.91	0.056	-0.0035	0.2579
Nkhotakota						
LD	0.1232	0.0830	1.48	0.138	-0.0395	0.2859
L2D	0-.0456	0.0782	-0.58	0.560	-0.1989	0.1077
L3D	0.0368	0.0760	0.48	0.628	-0.1122	0.1857
Mitundu						
LD	0.2607	0.0736	3.54	0.000	0.1165	0.4049
L2D	-0.0225	0.0697	-0.32	0.747	-0.1591	0.1141
L3D	-0.0046	0.0638	-0.07	0.942	-0.1296	0.1204
Chimbiya						
LD	-0.0318	0.0802	-0.40	0.692	-0.1890	0.1254
L2D	-0.1613	0.0741	-2.18	0.030	-0.3065	-0.0160
L3D	-0.1986	0.0666	-2.98	0.003	-0.3290	-0.0681
_cons	0.0095	0.0115	0.82	0.410	-0.0130	0.0319

Source: computations based on MoAFS monthly maize price data

Nkhotakota market: statistically significant adjustment parameters are observed for Nkhotakota-Lizulu market with -0.27, and Chimbiya-Lizulu with 0.16. The results also suggest that Nkhotakota market price changes are affected by one month ago maize prices in Mitundu and Lizulu.

Mitundu market: statistically significant adjustment parameters are observed for Mitundu-Lizulu with -0.32 and Nkhotakota-Lizulu with 0.22. Maize price change in

Mitundu are significantly affected by price changes in Nkhotakota two months ago, Chimbiya three months ago, Lizulu one month, two months and three months ago maize price changes.

Chimbiya market: statistically significant adjustment parameters are observed for Mitundu–Lizulu with 0.20 and Chimbiya-Lizulu with -0.34. Maize price change in Chimbiya is affected by the price change in Nkhotakota one months and two months ago, and the price change in Lizulu one month ago.

Lizulu market: statistically significant adjustment parameter is observed for Lizulu-Chimbiya with 0.14. The maize price change in Lizulu is affected by the price change three months ago in Lilongwe, price change one month ago in Mitundu, price change two months and three months ago in Chimbiya, and price change one months and two months ago in Lizulu.

Markets in the South

Limbe market: statistically significant adjustment parameter is observed for Limbe-Bangula with -0.14. The price change in Limbe is significantly influenced by the price change in Limbe itself one month ago (Table 5.25).

Lunzu market: statistically significant adjustment parameters are observed for Lunzu-Bangula with -0.19 and Luchenza-Bangula with 0.08. Maize price change in Lunzu is significantly affected by the price change in Luchenza and Bangula one month ago in both cases.

Luchenza market: statistically significant adjustment parameters are observed for Luchenza-Bangula with -0.33 and Lunzu-Bangula with 0.21. The maize price change in Luchenza is however not statistically affected by price changes in other markets in the south (Limbe, Bangula, and Lunzu) including the maize prices in Luchenza itself.

Bangula market: statistically significant adjustment parameter is observed for Limbe-Bangula with 0.09 and price changes in Bangula are not significantly affected by price changes in other markets in the south including Bangula itself.

Table.5.25: South Malawi Maize Markets Short Run Market Dynamics

Market	Coef.	Std. Err.	z	P>|z	95% Conf. Interval	
Change in Limbe prices						
_ce1 L1	-0.1416	0.0368	-3.85	0.000	-0.2137	-0.0696
_ce2 L1	-0.0185	0.0507	-0.36	0.716	-0.1179	0.0810
_ce3 L1	0.0530	0.0485	1.09	0.275	-0.0421	0.1480
Lagged own prices						
LD	-0.1761	0.0638	-2.76	0.006	-0.3012	-0.0510
Lagged other markets						
Lunzu						
LD	0.1033	0.0660	1.56	0.118	-0.0262	0.2327
Luncheza						
LD	0.0789	0.0536	1.47	0.141	-0.0263	0.1840
Bangula						
LD	-0.0125	0.0589	-0.21	0.832	-0.1280	0.1030
_cons	0.0172	0.0132	1.31	0.190	-0.0086	0.0430
Change in Lunzu prices						
_ce1 L1	0.0165	0.0363	0.46	0.648	-0.0546	0.0877
_ce2 L1	-0.1903	0.0501	-3.80	0.000	-0.2885	-0.0921
_ce3 L1	0.0793	0.0479	1.66	0.098	-0.0145	0.1732
Lagged own prices						
LD	0.0365	0.0652	0.56	0.576	-0.0913	0.1643
Lagged other markets						
Limbe						
LD	0.0674	0.0630	1.07	0.285	-0.0567	0.1909
Luncheza						
LD	0.1627	0.0529	3.07	0.002	0.0590	0.2665
Bangula						
LD	0.1987	0.0582	3.42	0.001	0.0847	0.3127
_cons	0.0130	0.0130	1.00	0.317	-0.0125	0.0385

Change in Luchenza prices	Coef.	Std. Err.	z	P>|z	95% Conf. Interval	
_ce1 L1	0.0056	0.0477	0.12	0.907	-0.0880	0.0991
_ce2 L1	0.2053	0.0659	3.12	0.002	0.0762	0.3345
_ce3 L1	-0.3332	0.0630	-5.29	0.000	-0.4566	-0.2098
Lagged own prices						
LD	-0.0098	0.0696	-0.14	0.888	-0.1463	0.1266
Lagged other markets						
Limbe						
LD	0.0750	0.0829	0.91	0.365	-0.0874	0.2375
Lunzu						
LD	0.0801	0.0857	0.93	0.350	-0.0880	0.2481
Bangula						
LD	0.0403	0.0765	0.53	0.598	-0.1096	0.1903
_cons	0.0081	0.0171	0.48	0.634	-0.0254	0.0416
Change in Bangula prices						
_ce1 L1	0.0891	0.0427	2.09	0.037	0.0054	0.1727
_ce2 L1	0.0459	0.0589	0.78	0.436	-0.0695	0.1614
_ce3 L1	0.0319	0.0563	0.55	0.580	-0.0792	0.1415
Lagged own prices						
LD	-0.0181	0.0684	-0.27	0.791	-0.1522	0.1159
Lagged other markets						
Limbe						
LD	-0.1182	0.0741	-1.59	0.111	-0.2634	0.02717
Lunzu						
LD	0.0659	0.0767	0.86	0.390	-0.0843	0.2161
Luncheza						
LD	0.0411	0.0623	0.66	0.510	-0.0810	0.1631
_cons	0.0245	0.0153	1.60	0.109	-0.0055	0.0544

Source: computations based on MoAFS monthly maize price data

The results demonstrate that some markets' maize prices are strongly affected by lagged prices in other markets while others are not. The determining factors seem to be the proximity between cointegrating markets, the quality of the road network, and vehicle trucking capacity linking those markets. For example, in the northern group of markets, Mzuzu maize prices are more affected by lagged prices in Rumphi than Karonga or

Chitipa because Mzuzu is only 64 km away from Rumphi with a good road and transport connection, while Karonga and Chitipa are each more than 150 km away and for Chitipa the road connection is additionally very poor. Similar considerations apply to the strength of price adjustments found in the other groups of markets.

Within the country as a whole, price adjustment are found to be strongest between the centre markets at almost 1 to 1 for all market combinations. This is perhaps not surprising given that the Central Region has the best road networks in Malawi, which facilitates the movement of maize from areas of surplus with low prices to areas of deficit with high prices. Moreover, other infrastructure (storage capacity, communications) associated with the capital city, Lilongwe, contributes to lower transport costs between markets, and more rapid adjustment of prices between them.

Overall, these results strongly indicate that maize markets in Malawi are spatially efficient in the three regions if not for the whole country. It should be borne in mind that stringent econometric conditions underlie these findings, deriving from the multivariate specification of the relationships between maize markets across Malawi. An intermediate step that examined markets in paired combinations found long run integration between markets right across Malawi; however, this is a weaker and less accurate method than the multivariate approach adopted here. The results support similar findings from other econometric analyses undertaken for the Malawi maize market. For example, Myers (2008) reaches a similar conclusion for the country as a whole by applying threshold auto regression techniques to weekly price data from July 2001 to October 2008, a time period of 378 weeks. Similarly, Rapsomanikis (2009) finds strong integration and rapid adjustment between eight Malawi maize markets, in the context of exploring relationships between those markets and international maize prices.

5.4 Summary of Key Findings

This chapter set out to provide the market conduct, structure and spatial integration aspects of maize marketing in Malawi that lies behind the maize seasonality findings of Chapter 4. In particular, evidence of poorly working and imperfect private markets could contribute to the explanation of high price seasonality, and to the proneness of the market to wild swings in prices when small imbalances occur in supply. The chapter reports the findings of fieldwork on farmers and traders conducted in three villages during the 2007/08 harvesting season. It also summaries the results of cointegration analysis conducted on time series maize prices in 13 markets.

It is fair to say that the findings of the fieldwork do not provide startling new insights into the working of the maize market in Malawi. Much of what was discovered has been observed by other researchers, although as is always the case, individual studies have tended to alight on one particular aspect or another to prioritise, and many studies are limited in geographical scope or in the aspect of marketing that they have examined. The most important finding of all is that the maize market in Malawi at the height of the harvesting season is highly competitive. There are numerous traders of every conceivable size, scope and capitalisation, from the casual bicycle trader to national level food manufacturers, operating in the market, and the sheer diversity of the structure makes it impossible for private traders to collude or 'corner the market'. It also seems unlikely that maize constitutes a 'missing market' in any but the most remote rural areas of the country (it is conceivable that there are a few villages at the end of such poor dirt tracks, and with so little to sell, that traders do not bother to go there). Of special interest was the finding that farmers are entirely indifferent to who they sell and are solely motivated by price offered, ensuring that arms length rather than personalised transactions are the norm. The fieldwork also emphasised more than many other writers have done the significance of informal imports from adjacent countries in adding to market supply at the height of the harvest. Since Malawi is a long thin country, in which few places (except central Lake Malawi towns) are more than about 100 km from a border with Mozambique, Zambia or Tanzania this means that whenever domestic prices in Malawi are out of line (upwards) relative to nearby countries, this flow of imports occurs.

The significance of this competitiveness finding is that it is not possible to explain high seasonal price instability by reference to 'poor market functioning'. The market functions fine; there must be other reasons for the intermittent recurrence of extreme price volatility, as well as for the Chapter 4 finding that alone amongst food crops, average seasonal price swings in the maize market have not declined in magnitude over the past 21 years. It is a proposition of this thesis (and of several leading researchers) that this volatility lies at the intersection of government action and the private sector, and does not rest with the private sector on its own in any meaningful sense. The next chapter looks more closely at this problem. In the meantime, a brief summary of other key points emerging from the maize market fieldwork is provided as follows:

(a) food security is a complex notion to pin down: it does not just reside in the number of months maize consumption coverage that households have after the harvest, but also depends on the other farm and non-farm options that are available to compensate for a maize shortfall;

(b) in this study, the village that sold the most maize, was also the village most deficit in maize from a food security standpoint at the household level, and also the village with the fewest alternative options for generating output or income that could compensate for this weak food security position;

(c) the principle reason for this seems to have been the dire need of very poor households for cash the instant that their maize harvest came in, causing them to sell maize even though this would definitely compromise their food security later in the lean season;

(d) interestingly, the position of such households was weakened further by free flowing informal imports in cross-border trade from Mozambique, since this adds to the volume of market supply at the same time as the Malawi harvest, and depresses prices in maize growing communities close to those border areas.

The sense of competitiveness in the maize market derived from the fieldwork in three maize producing villages, as also from key informant interviews with an array of market stakeholders, is reinforced strongly by the findings of the cointegration analysis conducted in Section 5.3 of this chapter. This analysis essentially shows that not only is the maize market in Malawi competitive, it also functions efficiently in terms of spatial arbitrage, with rapid adjustments of prices between markets that are close enough to each other for spatial arbitrage to take place between them. The cointegration analysis undertaken here is not the only such analysis undertaken on the performance of the maize market in Malawi (although the method applied varies in matters of detail between different researchers) and all concur on the efficiency finding.

Chapter 6 : Episodes of Extreme Seasonal Maize Price Instability 2000-2009

6.1 Introduction

In preceding chapters, this thesis has examined four interlocking dimensions of seasonal price instability in the maize market in Malawi. The first is the statement of the price seasonality problem in Malawi, and why it is a critical factor for vulnerability to food insecurity in the country (Chapter 1). The second is setting out the causes and effects of seasonality, and its relationship to the history of the maize market in Malawi (Chapter 2). The third is measuring the average magnitude of seasonal price instability in the Malawi maize market, and contextualising this in relation to different district maize markets and different food crops (Chapter 4). The fourth is examining the structure, conduct and spatial integration of the Malawi maize market, from which it is inferred that private trade in maize exhibits competitive market behaviour, and carries out spatial arbitrage in an efficient manner (Chapter 5).

All along, a key area of interest of the thesis is the occurrence of extreme price instability episodes, as seem to happen every 3-4 crop seasons in Malawi, and in the 2000s occurred in 2001-02, 2005-06 and 2007-09 (Figures 1.1 and 4.1 above). These episodes have devastating consequences for food deficit small farmers and poor consumers, and in some instances they result in large scale humanitarian operations in order to restore the food entitlement of poor people. To put them in perspective, the seasonal price margin they represent can be compared to the long run average margin of roughly 60 per cent that characterises the Malawi maize market in the long run. In 2001-02 the gap between the seasonal low and seasonal high real price (adjusted for inflation) was 280 per cent, in 2005-06 it was 165 per cent, and in 2007-09 285 per cent (in this case across two seasons). While the proximate cause of such events is often a lower level of production than had been predicted, the severity and duration of the subsequent price spike suggests serious dysfunction in the public policy response to early signs of a shortage of maize in the market. The purpose of this chapter is to examine the reasons for this dysfunction. In the process, it explores the ‘Jayne hypothesis’ (Jayne *et al.*, 2006; 2008b; Tschirley and Jayne, 2010) that the government tends to exacerbate rather that dampen down these price episodes, because its actions (driven often by political positioning) result in tightening up market supply rather than expanding it.

The chapter uses the analytic narrative method described in Section 3.7.1 above to construct a 'political economy' analysis of maize market events in Malawi in the 2000s. In interpreting such events, the interplay between private and public sector behaviour is examined carefully, as well as the sequencing of decisions made in the public domain. The significance of political factors in determining the timing and direction of public responses to emerging maize market imbalances is given special attention. At the centre of the chapter is the problem of public-private coordination failures which are recognised as the source of adverse welfare outcomes by both the 'coordination failure' (Dorward *et al.*, 1998; 2004a; 2009a; Kydd *et al.*, 2002) and 'partial liberalisation' (Kheralla *et al.*, 2000; Jayne *et al.*, 2002; 2006) branches of ideas about the functioning of food crop markets in eastern and southern Africa.

The chapter begins by examining price behaviour during each of these extreme episodes in more detail, and comparatively, to see if common patterns occur in each of them. This is followed by a consideration of the trends and events in maize volume data that help to explain price trends, including production, consumption, stock and import information. The chapter then examines each of the three price episodes as a detailed sequential narrative, in order to reveal the stances taken by key actors, the decisions taken, and the consequences of those decisions for stabilising the maize market. Finally, the chapter returns to the comparative picture, and draws out the repeated sequences of events that recur predictably in each such episode.

6.2 Prices, Production and Supply in Episodes of Excessive Maize Price Instability

Some writers have suggested the usefulness of separating political, natural and technical aspects of maize price crises from their policy and political dimensions (Devereux, 2002). The natural and technical aspects can be considered to cover climate events (deficit or excess rainfall), the output instability to which this gives rise, and the price behaviour in the market that then ensues. The policy and political aspects cover the sequences of public decision making associated with each crisis, and the political factors that seem to guide the character, speed and direction of such policy responses. There is also an important institutional dimension on the policy and political side, including private-public coordination problems.

This separation of the technical from the political is not, of course, watertight. For example, production figures are themselves political, and have become even more so in

Malawi since the advent of the Agricultural Input Subsidy Programme in 2005/06 and the expectation both inside and outside the country that the AISP has moved Malawi sustainably from maize deficit to maize surplus on the basis of domestic production. This is an aspect to which this chapter has cause to return at several points as its argument develops. In the meantime, the separation is considered to have some merit for organising the discussion, and it is followed here to some degree.

The discussion begins with a closer look at price behaviour in the Malawi maize market in the 2000s, centred on the three extreme price events that characterised the decade. The relevant data is set out in Table 6.1, which provides the complete time-series of national maize prices from July 2000 to June 2009, in both nominal and real terms. Real prices are nominal prices deflated by the Malawi CPI, with base-year 2000. Certain particular prices are highlighted by shading in the table for ease of reference. These are key seasonal minimum and maximum prices and switching points between upward and downward trends.

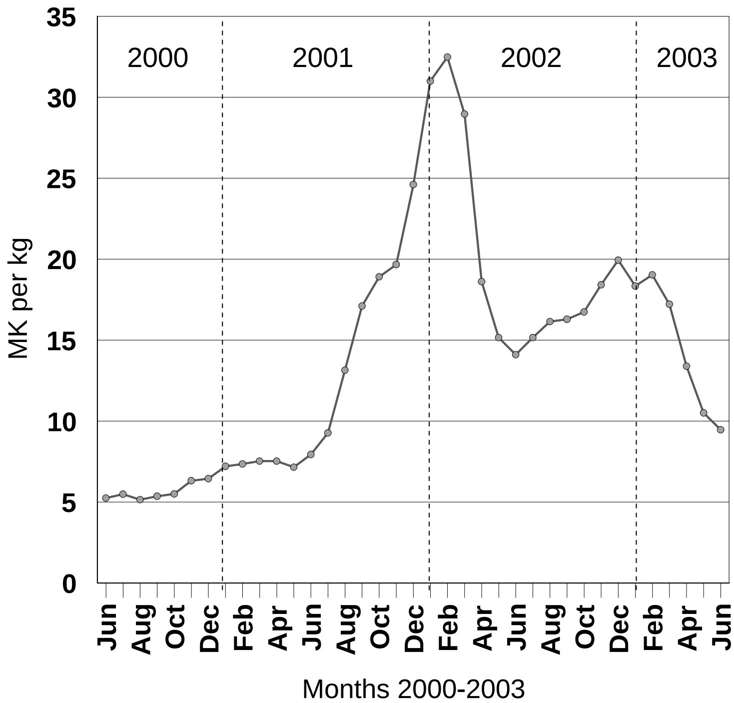
Figure 6.1 displays the maize price trend as it occurred in the 2001-02 crisis. In the pre-crisis season of 2000-01, the seasonal price rise from June 2000 to March 2001 was fairly routine. Prices rose from a low of MK5.25 kg in June to a high of MK7.53 kg in March (a rise of 43 per cent in nominal terms). However, prices then held at the same level in April 2001, then declined for one month only to MK7.16 kg in May 2001, before beginning on a steep upward trajectory. This was most unusual, and might have provided an early alert that available maize supply was in deficit. A price decline from peak to trough of just 7 per cent is so rare in the historical patterns of Malawi maize prices that urgent further investigation was indicated just on the basis of this indicator. Prices rose steeply from May to Feb (9 months), a lengthy and devastatingly adverse trend for rural households already exposed to insufficient food due to heavy rains and floods pre-harvest in 2001. Once extra imported supplies began to arrive in early to mid-2002, prices came off their peak sharply. However, as shown in Figure 6.1, prices did not return to former levels, and this applies in real as well as nominal terms. The nominal price increase from June 2001 to June 2002 was 51.2 per cent, while in real terms, this rise was 21 per cent.

Table 6.1**: Malawi Average Nominal and Real Maize Prices 2000-2009**

Month	2000-2003			2003-06			2006-09		
	Year	Nom.	Real	Year	Nom.	Real	Year	Nom.	Real
Jul	2000	5.49	5.87	2003	10.17	6.95	2006	18.76	8.35
Aug		5.15	5.67		10.44	7.09		19.30	8.36
Sep		5.36	5.39		10.83	6.95		20.39	8.62
Oct		5.51	5.28		12.62	7.41		21.32	8.58
Nov		6.32	5.61		14.05	8.25		22.19	8.67
Dec		6.45	5.57		13.83	7.88		22.24	8.74
Jan	2001	7.21	5.96	2004	15.97	9.13	2007	21.18	8.50
Feb		7.35	5.94		16.61	9.67		19.22	7.89
Mar		7.53	6.16		19.12	11.32		18.21	7.75
Apr		7.53	6.21		16.66	10.20		16.03	6.89
May		7.16	5.94		13.44	8.20		14.26	6.28
Jun		7.94	6.80		12.96	7.50		14.61	6.11
Jul		9.27	7.88		13.63	7.79		15.63	6.49
Aug		13.14	11.19		14.00	7.78		16.86	6.80
Sep		17.11	13.87		15.73	8.53		18.04	7.09
Oct		18.91	15.73		15.86	8.17		20.76	7.76
Nov		19.67	16.74		17.29	8.63		24.11	8.72
Dec		24.60	21.30		17.53	8.72		28.67	10.41
Jan	2002	31.00	22.17	2005	17.88	9.03	2008	34.18	12.68
Feb		32.48	22.57		17.61	9.03		39.69	15.09
Mar		28.96	20.21		17.36	9.17		43.53	17.08
Apr		18.62	13.23		15.93	8.46		35.41	14.00
May		15.16	10.89		16.39	8.67		32.83	13.25
Jun		14.10	10.45		18.00	9.00		37.94	14.50
Jul		15.16	11.26		18.68	9.22		48.72	18.47
Aug		16.15	11.95		20.55	9.83		55.52	20.43
Sep		16.29	11.42		23.15	10.78		53.38	19.08
Oct		16.74	11.76		29.11	12.85		54.33	18.45
Nov		18.42	12.67		32.77	13.97		57.81	19.07
Dec		19.94	13.51		34.34	14.65		63.47	21.04
Jan	2003	18.34	11.51	2006	41.68	18.20	2009	69.22	23.50
Feb		19.03	11.74		50.67	22.44		70.57	23.28
Mar		17.22	10.90		45.95	21.06		65.27	21.63
Apr		13.39	8.67		27.46	12.68		45.36	15.41
May		10.51	6.93		19.07	9.00		34.08	11.92
Jun		9.47	6.47		18.31	8.19		32.98	11.93

Note: Real prices are nominal prices divided by the CPI (2000 = 100)
Source: MoAFS, Agro-Economic Survey Unit

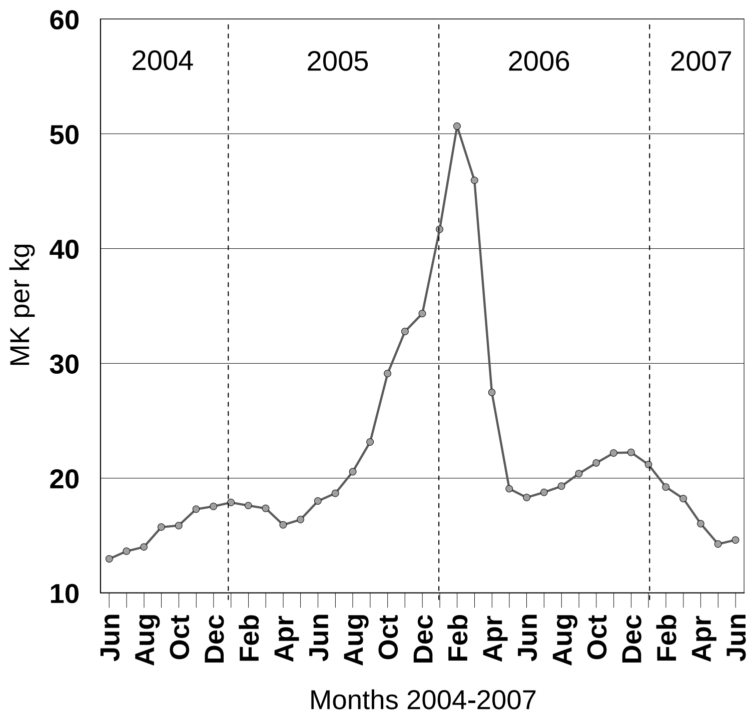
Figure 6.1: The 2001-02 Maize Price Spike



Source: monthly maize price data published by MoAFS, Government of Malawi

The parallel set of price circumstances that occurred in the 2005-06 crisis is shown in Figure 6.2. Here again, the pre-crisis season (2004-05) displays a rather subdued seasonal price spike, with prices rising from a low of MK12.96 in June 2004 to a high of MK17.88 in Jan 2005, an increase of 38 per cent. Prices then declined modestly to MK15.93 in April 2005, before starting an extended upward trajectory lasting 10 months. As in 2001-02, the warning signs of future shortage were apparent in the low and short price decline at the time of the 2005 harvest (this is aside from a low forecast for the 2005 harvest that was available to decision makers long before the harvest arrived). In the 2005-06 crisis, prices rose to MK50.67 in February 2006, representing an increase of 218.1 per cent in nominal terms or 165.2 per cent in real terms. Prices then fell extremely sharply to MK18.31 in June 2006, associated with an excellent growing season and harvest, and the first implementation year of the AISP. The real price of maize in June 2006 was the lowest it had been since June 2004, but nevertheless represented a 9.2 per cent real increase when comparing seasonal lows in those two years.

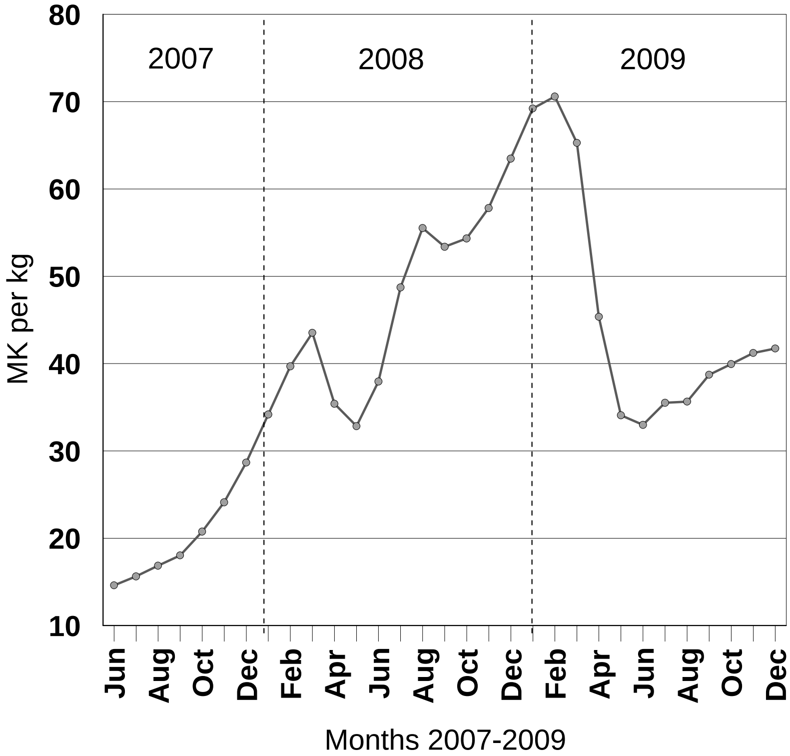
Figure 6.2: The 2005-06 Maize Price Spike



Source: monthly maize price data published by MoAFS, Government of Malawi

The 2007-09 price crisis is interesting for several reasons. As will be seen shortly, this was a period when Malawi was supposedly comfortably in maize surplus from domestic production throughout. The nature of the price spike also differs from the two preceding examples. It occurs across two crop seasons, rather than one, with a dip in prices in the middle of a sustained and steep upward trend (Figure 6.3). In this instance, the starting point is May 2007 when the exceptionally low nominal price of MK14.26 is recorded. Indeed prices in the post-harvest period in mid-2007 were only 6 per cent in real terms above those of the year 2000. However, these unusually low prices were followed by a steep rise through the 2007 lean season to reach an initial peak of MK43.53 in March 2008 (a nominal rise of 205.3 per cent). There was then a moderate harvest season fall back to MK32.83 in May 2008, followed by a further steep rise to MK70.57 in February 2009. The short-term 'wobble' in this rise that occurred in September-October 2008 is explained in due course. Overall, nominal prices rose by 115 per cent in the 2008-09 season and by 395 per cent across the two seasons. The equivalent real increases were 76 per cent for 2008-09 and 285 per cent for 2007-09 (trough to peak price movements).

Figure 6.3: The 2007-09 Maize Price Spikes



Source: monthly maize price data published by MoAFS, Government of Malawi

The nominal price patterns described above are summarised and compared in Table 6.2 below. These extreme price episodes share much in common, although the 'double' price hike of 2007-09 makes the latter differ in some respects. In all cases, the trends preceding the price crisis are distinguished by the relative small drop in prices that occurs at harvest time, and often by relatively low price seasonality overall in the preceding season. One could go as far as to say that when the drop from peak to trough at harvest is small and curtailed in duration, then a very serious adverse situation is going to develop in the ensuing lean season. In these cases, the seasonal lowest price is earlier (occurring in March or April) than the typical trough in June. Also in these cases, the lean season price increase is steeper and lasts for a longer time (9-10 months) as compared to the typical 6-7 months price rise from the lowest to the highest month. In 2007-09, these factors are effectively 'chained' in two successive seasons, making the combined effect more severe than either of the other two events.

These price trends are of course mainly explained by the physical quantity of maize available in markets, which in turn depends on domestic production levels, net stock changes, and net import levels. A starting point for considering the underlying maize supply position is to examine trends in the 'maize balance sheet', in other words the extent to which domestic production satisfies domestic demand for maize. This is done in Table 6.3 and Figure 6.4. This also provides an opportunity to talk about 'natural factors' in the occurrence of maize price crises in Malawi.

Table 6.2: Nominal Price Switching Points, 3 Price Episodes

Time Span	Pre-Crisis Season						Crisis Season		
	Low MK/kg	**High MK/kg**	**Rise %**	**Low MK/kg**	**Fall %**	**Duration months**	**High MK/kg**	**Rise %**	**Duration months**
2000-02	Jun 5.25	Mar 7.53	43.4	May 7.16	-4.9	2	Feb 32.48	353.6	9
2004-06	Jun 12.96	Jan 17.88	38.0	Apr 15.93	-10.9	3	Feb 50.67	218.1	10
2007-09	Jun 14.61	Mar 43.53	197.9	May 32.83	-24.6	2	Feb 70.57	115.0	9

Source: derived from MoAFS price data provide in Table 6.1

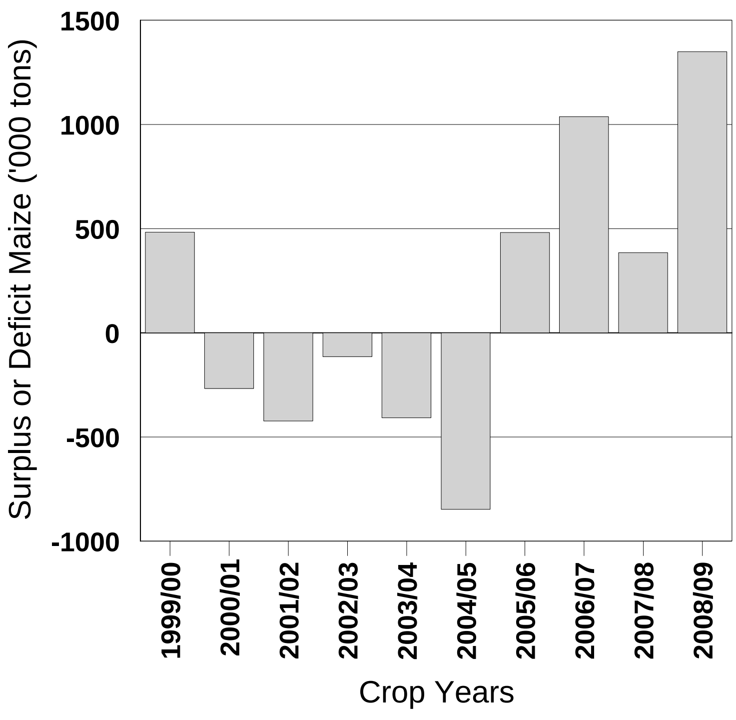
Table 6.3: Maize Balance Sheet 2000-2009

Crop Year	Production	Consumption Needs	Surplus or Deficit	Surp/Def % Needs
1999/00	2,290,018	1,806,993	483,025	26.7
2000/01	1,589,437	1,857,201	-267,764	-14.4
2001/02	1,485,272	1,908,805	-423,533	-22.2
2002/03	1,847,476	1,961,842	-114,366	-5.8
2003/04	1,608,349	2,016,353	-408,004	-20.2
2004/05	1,225,234	2,072,378	-847,144	-40.9
2005/06	2,611,486	2,129,960	481,526	22.6
2006/07	3,226,418	2,189,142	1,037,276	47.4
2007/08	2,634,701	2,249,969	384,732	17.1
2008/09	3,661,732	2,312,485	1,349,247	58.3
Average	2,218,012	2,050,513	167,499	8.2

Note: consumption trend is not the same as that given in official MoAFS maize balance sheet.
Source: production data MoAFS crop estimates; consumption trend as explained in the text.

The maize balance sheet set out in Table 6.3 is not the same as the 'official' Malawi maize balance sheet that is produced by MoAFS. The latter has certain quirks in the consumption side figures that occur from one year to the next that are not explained, and on close examination are sometimes rather unsatisfactory. The production figures are the official (final) maize production estimates as published by MoAFS. The consumption needs figures are based on an annual population growth rate of 2.78 per cent (this is the intercensal rate between the 1998 and 2008 censuses), and a constant maize requirement per capita of 172.2 kg person per year (which is the mean figure for the decade derived from the MoAFS balance sheet). This procedure is consistent with the approach adopted by FEWSNET, which assumes that the contribution of maize to dietary calories in Malawi is constant at 73.8 per cent on a per capita basis (FEWSNET, 2007). The consumption needs trend can be lowered or elevated by making a different assumption about the calorie contribution of maize, and hence about the annual kg needs per person. The size of surplus or deficit can also be affected by assumptions about physical losses between harvest and consumption. However, the purpose here is not to seek pinpoint accuracy about these levels (an impossible task in any case), but to identify the chief imbalances giving rise to observed price behaviour.

Figure 6.4: Estimated Maize Surpluses and Deficits from the Maize Balance Sheet



Source: Table 6.3

From a production standpoint, Table 6.3 characterises the 2000s as a decade of two distinct main phases. There is a variably low output phase lasting five years from 2000/01 to 2004/05, and a variably much higher output phase lasting so far for the years 2005/06 to 2008/09. While the average maize output for the entire decade was 2.2 million tons, the 'low output phase' is associated with a mean annual harvest of just over 1.5 million tons, while the 'high output phase' displays a mean annual harvest of 3 million tons. In other words, maize harvests in Malawi, on average, doubled between the first and second of these two phases, according to official production figures.

The surplus or deficit column in Table 6.3 helps to explain price events in the 2001-02 and 2005-06 price episodes, but not so the long run up in prices that occurred across 2007 to 2009. In 2000-01 there was a sharp drop in output compared to the preceding two years, leading, as shown, to a shortfall of around 270,000 tons. A further poor year in 2001/02 exacerbated this deficit. The main cause of the drop in harvest in 2001 was excessive rain and flooding that occurred in February-March 2001, causing a proportion of the new crop to rot on the stem, as well as seriously disrupting rural transport networks. In 2002, widespread dry spells in the growing season reduced yields and the final harvest.

In 2004-05 there was a very poor harvest indeed, possibly resulting in a gap of over 800,000 tons between production and consumption. The critical factor here was again lack of rainfall in the planting and growing seasons. It is easy to see how this would have triggered a run up in prices in the succeeding lean season in 2005-06 (depending, of course, also on any ameliorative action taken). In 2007-09, by contrast, Malawi was supposedly floating on huge maize surpluses. Even allowing for restocking food security reserves, and a decision to export about 400,000 tons (on which more in due course), there is no trigger on the production side that can explain the run up in prices that occurred from mid-2007 to early 2009.

Maize available for consumption depends on food security stock changes and net trade quantities in addition to production. These cannot be examined very satisfactorily on an annual basis, since it is the timing of these additions to, or subtractions from, maize availability that determines whether incipient price pressures are prevented, lessened in intensity or duration, or allowed to run their course. Unfortunately, monthly data on many of these key variables is almost impossible to reconstruct for a variety of reasons.

On the stock side, there are different institutional entities and different categories under which public stocking of maize occurs. There is ADMARC which is responsible for sales of stock to consumers (usually at prices prescribed by the government), and purchase of grain from farmers both for its own operational purposes and for the National Food Reserve Authority (NFRA). The NFRA purchases grain from ADMARC, from private traders, and from abroad (when given a directive to do so by the government). It also holds grain on behalf of bodies like WFP who with the agreement of government and funding from donors bring in food aid for various purposes. In addition, NFRA stocks are allocated between commercial stocks (intended for sale to the public via ADMARC) and the Strategic Grain Reserve (SGR) held for purely food security purposes. On the import side, informal (unlicensed cross-border) trade plays a critical role, and the volumes involved are estimates subject to wide margins of error. Also formal imports may be undertaken by government or private traders (under license), or by food aid agencies like WFP.

A digression is useful at this point on the status and function of NFRA. The latter was created in 1999 under donor pressure as a means of taking out of ADMARC the management of the Strategic Grain Reserve (SGR), due to a conflict of interest perceived by the donors between ADMARC's buying and selling activities and its national grain reserve obligations. NFRA early encountered difficulties. It was not provided at inception with a capital fund to conduct purchases, and therefore borrowed money commercially in order to build up stocks. By June 2000, it had incurred a debt of approximately MK1 billion while building up a stock of over 180,000 tons. It is in this context that the IMF then recommended to the government that its stocks should be reduced to a strategic level of 60,000 tons, by commercial sales at market prices, in order to pay down a significant proportion of its debt (Devereux, 2002). The significance of this event becomes apparent in the narrative account of the 2001-02 food crisis that follows shortly.

Due to continuing ambiguity between transfers out of stock for sales to consumers through ADMARC, and its 'pure' food reserve role, in 2005, NFRA stock operations were formally split between a commercial stock and the SGR. The commercial stock comprises purchases (via ADMARC) from farmers, or imports under government license, for the purpose of sales (via ADMARC) to consumers at government fixed prices. The SGR represents a stock held for humanitarian distribution in the event of a crisis, the level of which at 60,000 tons is often assisted by donor contributions. In theory, the commercial operations should yield a sufficient margin to cover the management and operating costs for both the commercial and SGR branches of NFRA operation.

With regard to imports, initial evidence was provided in Table 4.12 (Chapter 4) to show the significance of informal border trade for maize supply in Malawi. The volume of such trade varies according to the size of harvests in adjacent countries, and also according to the price differential for maize between countries. Here, the picture of informal imports is expanded, with data being provided on estimated quarterly cross-border flows where available (Table 6.4). Estimates provided by Whiteside *et al.* (2003) suggest that the famine of 2001-02 would have been very considerably worse without informal imports, put at 155,000 tons in 2001-02 and 246,000 tons in 2002-03. A steep rise in Malawi prices during and immediately after the maize harvest tend to bring in greater volumes of cross-border maize, and this occurred again in 2005-06 when it is thought 156,300 tons was imported this way. On average, over a period of 9 years, informal trade may have been responsible for around 106,000 tons of maize a year, equivalent to 5 per cent of mean production over the decade of the 2000s.

Table 6.4: Annual and Quarterly Data on Informal Cross Border Maize Imports

Year	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Full Season
2001/02	n.a.	n.a.	n.a.	n.a.	155,000
2002/03	n.a.	n.a.	n.a.	n.a.	246,000
2003/04	49,000	n.a.	n.a.	n.a.	49,000
2004/05	10,949	33,864	21,585	20,593	86,991
2005/06	29,621	28,090	42,603	55,948	156,262
2006/07	27,482	27,069	15,910	9,120	79,581
2007/08	21,637	19,827	7,731	8,389	57,584
2008/09	25,909	26,627	6,251	3,734	62,521
2009/10	19,970	20,941	11,305	8,817	61,033

Note: n.a. = data not available for these quarters.
Source: (Whiteside *et al.*, 2003;FEWSNET, 2009; 2010)

Informal imports play a critical role, not just due to their estimated volume, but because they represent a significant addition to marketed supplies available for purchase by consumers. It is recalled that various estimates suggest that only around 15 per cent of maize produced in Malawi is sold by those who produce it. This means that in an average year of the 2000s (see Table 6.3) marketed supply from domestic harvests is around 330,000 tons. In this light, 110,000 tons of informal imports increases available market supply by one third. And this can also be seen in relation to restocking policies by ADMARC and NFRA. When these agencies have been ordered by the government to secure a certain proportion of their stocks from domestic production, the places they send their agents to procure grain are the border crossing points where private traders are often able to deliver large quantities at the required prices.

A further most important finding of the monitoring of cross-border trade that has been in place since 2004/05 is that informal exports are scarcely significant in the overall picture, even in years when Malawi has a healthy maize surplus. Estimated export volumes in the four seasons 2004/05 to 2007/08 were 571, 1,158, 3,721, and 7,115 tons in each season respectively (FEWSNET, 2009). In 2008/09 volumes were so low as to be recorded as negligible. This becomes interesting later in this chapter, since placing a ban on exports is one of the predictable responses by government to steeply rising domestic maize prices, occurring in every price crisis in the 2000s. Yet rising maize prices in Malawi increases the incentive for traders in adjacent countries to export to Malawi, while making it less attractive for Malawi traders to export maize.

Formal imports and exports are also relevant to interpreting the sequence of events that occurred at times of price crisis. Data on formal maize trade for the calendar years 2000 to 2007 are provided in Table 6.5, including the calculation of net formal imports after deducting export outflows of maize. Formal foreign trade in maize varies considerably from one year to the next, depending especially on government decisions to enter into specific import contracts. The table reveals some data pertinent to interpreting price spikes, their antecedents, and their aftermath. For example, there was a huge rise in maize imports recorded for 2002, a year in which the government took late receipt of the majority proportion of a delivery contract for 150,000 tons of maize, as well as trying to fulfil another contract for 240,000 tons. In the end 363,000 tons were imported under these two contracts. Most of this maize arrived too late as far as the 2001-02 maize crisis was concerned, but it did help to head off a continuation of that crisis in 2002-03. It also resulted in excessive maize stocks that were sold off at a loss, partly in the domestic market, and also to exports (as shown by the larger than usual export figure for 2003). As might be expected imports were again substantial in 2005, and were an important reason, other than good weather and the fertilizer subsidy, for the substantial decline in maize price that occurred from the 2005-06 peak (Figure 6.2 above). Finally, a very substantial export figure of 390,000 tons occurs in 2007. These exports are discussed later in relation to the politics of the 2007-09 price episode. However, it can be noted here that 390,000 tons exports should have been well within the capability of Malawi to supply without disrupting its internal market, if the production figure for 2006/07 (Table 6.3) is to be believed. In principle, this was considerably less than half the excess of production over consumption in the period in which the exports took place.

Table 6.5: Malawi Maize Formal Imports and Exports 1999-2007

Year	Imports	Exports	Net Imports
1999	28,163	90	28,073
2000	7,879	11,000	-3,121
2001	9,326	9,879	-553
2002	348,365	1,644	346,721
2003	61,836	54,604	7,232
2004	54,300	12,607	41,693
2005	113,300	467	112,833
2006	55,808	1,160	54,648
2007	20,180	391,255	-371,075

Source: (FAO, 2009a)

As already stated, these technical relations of supply and prices, and the annual aggregates of much of the foregoing discussion, are only half the story of the recurrent adverse price episodes that Malawi experienced in the 2000s, and in some ways they are not even the most interesting half from an explanatory viewpoint. Extreme price spikes are a manifestation of market forces escaping the ability of public decision makers to take successful counteractive measures. A range of possible explanation could account for this. Governments may be reluctant for political reasons to admit a crisis, and then act too late. They may deploy instruments that prove ineffectual at halting price rises. They may inadvertently exacerbate the trend through actions that intensify the shortage of maize supply (the 'Jayne hypothesis'). While any or all of these reasons may play a part (and a few others besides), a narrative examination of the three extreme price episodes during the 2000s helps to provide traction for distinguishing the more from the less important factors in such events, and it is to this task that this chapter now turns.

6.3 A Narrative Account of the Three Adverse Price Episodes in the 2000s[28]

In this section of the chapter, each of the three episodes of excessive price instability in the 2000s is examined in the form of a narrative of events as they occurred, in which the focus shifts to the actors involved in decisions, the interpretations they placed on the evidence before them, and the role of political factors in determining certain reactions to events. Where possible, the chapter also comments on the role of the private sector in these events, and on the shifting interaction between public and private sectors that occurs as events unfurl. Ultimately, it is hoped to shed light on the central issue of public-private coordination, and how and when it goes seriously wrong.

The 2001/02 Famine

This is the only one of the three episodes examined here in which there were a high number of visible casualties of the shortage of maize in the market, and several thousand people are known to have died of starvation. The 2001/02 episode is often therefore referred to as the Malawi famine of those years. It is also the episode about which most has been written, and has been analysed and thought about (especially in terms of lessons to be learnt) by many researchers (Devereux, 2002; IMF, 2002; Stevens *et al.*, 2002, Oygard *et al.*, 2003; Whiteside *et al.*, 2003; Takavarasha, 2006). The severity and duration of the maize shortage (and accompanying spiralling prices) is ascribed in these sources, with differing amounts of emphasis, to the following factors:

(a) flood damage to the 2001 maize crop (already noted);

(b) inopportune (and almost certainly corrupt) sell off of the national maize stock during the first six months of 2001;

(c) persistent optimism regarding the high level of output of substitute foods, especially cassava, originating in data supplied by MoAFS but diffused widely by FEWSNET;

[28] This section of the chapter makes extensive use of FEWSNET Food Security Updates (monthly) for Malawi, found on the website http://www.fews.net/Pages/default.aspx. Reports are only mentioned individually where a particularly significant insight is obtained from their analysis.

(d) a reluctance by donors to engage with government on potential maize shortages, due to the corrupt sale of the maize stock, and other governance issues;

(e) slow and late decisions to import maize, predicated in part on the preceding optimism about maize substitutes, but also due to political unwillingness to admit to a maize crisis;

(f) late arrival of maize ordered, due to shortage of supply in neighbouring countries and transport bottlenecks (most of the maize arrived in 2002);

(g) the sheer poverty of the Malawian rural population, giving them no resilience in the face of rising maize prices, and creating 'a crisis of exchange entitlement' for maize.

In terms of the sequence events, more detail on some of these explanations is useful, and this also eventually begins to provide some idea of underlying political factors that caused certain positions to be taken at particular points in time. It needs to be borne in mind that Malawi had two excellent maize harvests in the two years preceding the crisis, 1998/99 and 1999/00, when 2.2 and 2.3 million tons were produced respectively. The government of President Bakili Muluzi had attained power for a second term in 1999, and success in maize production was a main pillar of its appeal to the electorate. In March 2000, national maize stocks held by the NFRA and other agencies stood at 186,369 tons (FEWSNET, 2001a). In February and March 2001, Malawi experienced widespread heavy rains and flooding, in a period when the rainy season is typically tailing off allowing maize to ripen for the harvest occurring from late March onwards. The government was quite quick to declare the floods a national disaster, which the President did on 22 February and an appeal to donors for US$6.7 million for relief and rehabilitation was made by the government on 6 March.

The stance of the government then, and for many months to follow, was that Malawi was food secure. Even though the final crop estimate for maize was revised down, suggesting a possible 270,000 tons maize consumption gap, Ministry of Agriculture figures for other crops displayed record estimates for rice, cassava, and sweet potatoes, such that FEWSNET declared in July 2001 that there was food surplus in the country of 263,145 tons maize equivalent. Much has been made in reviews of the crisis of the position taken in successive months by FEWSNET food security reports that remained steadfastly optimistic about food availability in Malawi through 2001. However, it is apparent on re-reading these reports a decade later that FEWSNET was mainly synthesising data and interpretations about the food position supplied by MoAFS. Rising maize prices in the period August to October 2001 were treated rather casually, and not as evidence of a severe deficit of food emerging. Indeed, ADMARC was permitted to increase its sales price to consumers from MK5 to MK17 per kg in August 2001 (a 240 per cent nominal increase), and this was couched in the food security reports as a manoeuvre to try to outwit private traders (preventing them buying maize at MK5 from ADMARC and re-selling at much higher market prices), rather than as a massive change in the affordability of maize for poor consumers.

In the early part of this sequence, and indeed for many preceding months, the national maize stock had been gradually and inexorably depleted until it ran out completely in August 2001. The factors surrounding this run down is well-trodden ground (Devereux, 2002; Stevens *et al.*, 2002; Cromwell and Chintedza, 2005, Takaravash, 2006). NFRA was holding a huge maize stock that it did not have the financial capability to maintain, and the IMF had pressured the government during 2000 to reduce this stock to the NFRA mandated level of 60,000 tons, partly so that NFRA could pay off some of its debt, and partly to avoid mounting losses in store (due to deterioration and theft). Sales, however, went far beyond this requirement, and the manner in which they took place, involving combinations of non-transparent decisions by ADMARC and NFRA management, suggests that a cycle of collusive actions took place involving senior government leaders, big private traders and the decision makers in the storage agencies. As shown in Table 6.6 below, total public stocks of maize fell from 116,165 tons at the start of January 2001 to zero stocks by August 2001, and remained at zero until August 2002, when they began to pick up again in volume rapidly due to the arrival of imports.

Presumably as much to do with the stock depletion as anything else (because no one in government was admitting a food crisis at that stage), in August 2001 the government entered into a contract with a South African agency to import up to 150,000 tons of maize over the period to the end of the year. However, this contract was slow to be fulfilled for a variety of commercial and logistical reasons. Other countries of the region were also experiencing maize deficits and were trying to source from South Africa, the price for South African white maize was rising, and transport bottlenecks on main routes to Malawi were prevalent. Instead of obtaining 50,000 tons per month in

October-December 2001, just 2,594 tons had arrived by end-October and a cumulative 27,355 tons by end-December. On arrival, this maize was not going into store, but straight out to consumers at ADMARC outlets at the official selling price of MK17 per kg.

Table 6.6: Evolution of NFRA Stocks 2001-03, Monthly
(all figures in tons maize)

Month	2001	2002	2003
Jan	116,165	0	261,023
Feb	85,640	0	258,000
Mar	64,727	0	266,000
Apr	53,778	0	250,000
May	40,331	0	258,000
Jun	35,174	0	212,936
Jul	14,411	0	210,538
Aug	0	79,553	208,139
Sep	0	122,285	205,741
Oct	0	164,653	203,342
Nov	0	209,778	168,251
Dec	0	264,045	118,321

Note: figures for Jul-Sep 2003 are interpolated from adjacent months
Source: FEWSNET Food Security Updates (monthly) for this period

The government remained steadfast in its refusal to recognise a food crisis through to February 2002, when on 22 February the President eventually declared a national disaster. By then, as we have seen, the market price of maize had risen to MK32.5, a rise in real terms of 280 per cent over the preceding May. International NGOs and civil society groups in Malawi were instrumental from late 2001 in forcing this change of stance, however, it is the case that as late in the sequence as November 2001, when Save the Children made a presentation to government and donors verifying the emergence of famine in Mchinji and Salima districts, their appeals for emergency action were rejected (Devereux, 2002). The donors were not helpful. They were distrustful of a government that had wilfully permitted the national reserve stock to be sold off, and did not wish to signal that assistance would be as readily forthcoming as usual. In fact, by late February 2002, it had become almost beside the point to declare disaster. The next harvest was in prospect, and hungry rural people had begun to eat 'green maize' (unripe maize on the cob) to compensate for the lack of food available in rural areas. ADMARC was distributing maize from the import contract (now coming in at 20,000 tons per month) but rationing individual sales to either 10 kg or 25 kg in different parts of the country. A ban on private traders purchasing from ADMARC had been announced in January 2002.

From March 2002, and for many months afterwards, the political stance on food security in Malawi switched to an entirely opposing view from the 'denial' position of 2001 and 2002. In April 2002, the NFRA announced a 240,000 ton purchase programme to replenish food security stocks and provide for maize sales through ADMARC. Since predicted maize output in the 2002 season was another low of 1.5 million tons, FEWSNET began forecasting the emergence of a 400,000 ton food gap, at one point even rising to a 570,000 ton gap (June 2002). Also in June 2002, the WFP announced an 'emergency operation' (EMOP) to distribute 54,426 tons of food commodities to 2.1 million targeted beneficiaries. The donors piled in, and the EU agreed in August 2002 to fund the local purchase of 40,000 tons to replenish the SGR. By end-December 2002, NFRA and other public stocks contained 264,045 tons of maize, cumulative food aid during 2002 had reached 122,625 tons, and NFRA had procured (mainly from imports) 226,801 tons of its intended 240,000 purchases for commercial sale. In the meantime, ADMARC was distributing maize at MK17 through late 2002 and early 2003, and the peak national market price in the 2002-03 lean season was just MK19.94 in December 2002.

Politically, 2002 was the year when President Muluzi tried and only narrowly failed to force through the Malawi parliament a change in the constitution that would have permitted him to stand for a third term in office. By the 2002/03 maize season, the next general election to be held in 2004 was also on the horizon. During the second half of 2002 and into 2003, the maize stock and availability position overshot just as extremely in the abundance direction as it had failed to meet minimum acceptable food security requirements in 2001. The NFRA stock peaked in March 2003 at 266,000 tons; however, by then market prices were drifting below the ADMARC selling price of MK17 so it was not possible to reduce this stock through public sales. In June 2003, the government announced a reduction in the ADMARC selling price to MK10 per kg, a price that was then held until Sept 2004, when it reverted back to MK17. The period from early 2003 to mid 2004 saw a massive sell off of the stocks accumulated during the 2002-03 restock. By January 2004, for example, the NFRA had sold 226,385 tons of these previous purchases. This explains the low price seasonality that occurred in the 2003-04 and 2004-05 seasons (see Table 6.1 above) despite the harvests in these two years being rather poor (especially the 2004 harvest at 1.6 million tons).

The 2001-02 famine and its aftermath have important lessons for the intersection of politics and food security to carry forward, as also for the intersection of the private and public sectors in maize trading. These are explored in more detail, comparatively, when the other price spikes of the 2000s have been examined. However, one notable political feature that is worth drawing attention to at this point is the reluctance of governments to change their mind from a firmly stated position, notwithstanding accumulating evidence to the contrary. This is of course a political phenomenon (an admission of being wrong as a sign of weakness etc.) that is common to governments (elected or not) the world over, and is by no means unique to Malawi. Also not unique to Malawi, but manifested in a rather extreme form in this food insecurity episode was the adoption of calculated stances that seemed partly to do with electoral considerations, and partly to do with patrimonial ones associated with loyalty and personal gain. While irrefutable evidence will no doubt never be found, the coincidence of the complete sell-off of 180,000 tons of public maize stock with an ever more vigorous political defence of the abundant food available in the country seems to suggest rather powerfully that patrimonial considerations entirely overruled alternative arguments put forward as the crisis deepened (Cromwell and Chintedza, 2005).

The 2005-06 Food Crisis

Very little has been written about the 2005/06 food crisis compared to 2001/02 famine and the 2007-09 price spike. This is possibly because this was the first year of the AISP, and the 2006 maize harvest turned out to be a historical record at 2.6 million tons. The price spike at February 2006 had, of course, its antecedents in the previous year's very poor harvest (1.2 million tons) and in the stock position and import ordering associated with the lead up to that harvest (Dorward *et al.*, 2008; FEWSNET, 2005a; 2005b; Menon, 2007). An important consideration in early 2005 was the avoidance of the excessive supplies that had characterised the maize market through 2003 and 2004, and which had involved selling substantial quantities of stock at prices only a fraction of their import cost. For example, a substantial proportion of NFRA imports in mid-2002 had a landed cost of US$285 per ton, equivalent to MK28 per kg, compared to the

ADMARC sales price to consumers of MK17 reducing to MK10 in June 2003 (FEWSNET, 2003).

In January 2005, the government and donors concluded a review of the humanitarian assistance programme that had run through 2004, and decided that a few outstanding import contracts that had not yet been fulfilled should be cancelled since the food security situation did not warrant the potential financial losses that might be involved. However, the growing season of 2004/05 was encountering widespread and lengthy dry spells, and by February 2005 it was becoming apparent that the 2005 harvest might not be as high as at first predicted. At this stage prices were relatively low (the price peak in January 2005 was MK17.88), and the SGR had just been replenished to its 60,000 ton target with assistance from the EU. ADMARC was selling grain out of store at MK17 (the price since Sept 2004), and there were 80,000 tons commercial stocks available for sale at the NFRA. In addition, various food aid operations were going on in maize deficit areas scattered across the country.

In March 2005, MoAFS second round crop estimates forecast a 25 per cent drop in the 2005 maize harvest, resulting in a national cereal gap upwards of 300,000 tons. The donors and government consulted in April 2005 and made the decision to import in good time as opposed to the 2001/02 crisis when donors had been reluctant to support the government, and the government itself, as we have seen, was unprepared to admit the existence of a food security problem. At the end of March 2005, SGR stocks had dropped to 27,000 tons, commercial stocks to 23,000 tons, and ADMARC was carrying about 3,000 tons in operational stocks. The government, with assistance from DFID and the EU issued a tender for 29,000 tons to replenish the SGR. In addition, government announced its intention to purchase 100,000 tons of maize with 30,000 tons for sale to the public and the rest intended for relief purposes. However, no maize import contract had been issued by the end of May 2005.

In July 2005, the President established and launched the Feed the Nation Fund, a voluntary trust into which charitable donations could be put to feed households affected by a food shortage. The government also announced an export ban on maize and fertilizer. Data on cross-border movements of maize suggest, however, that the export ban on maize was irrelevant since the flow was almost entirely inward (estimated 40,000 tons inflows vs. 260 tons outflows). Moreover, the increased prevalence of official inspection of trucks that accompanied the ban, acted as an inhibition to the informal import flow that was helping the local supply situation remain under control. A further decision in this period was to encourage farmers to grow winter maize in the hope that a significant addition to domestic supply could be made towards the end of the calendar year from winter sowing. To this end the government distributed 60,000 treadle pumps free to farmers who signed up to try to grow off-season maize.

Later in July 2005, the government issued important restrictions on the origin of the 100,000 tons of maize it had announced it was going to procure back in April. The maize had to originate from the SADC region, excluding Malawi. The reason given for this by the government was that it did not wish to further tighten domestic supply by trying to procure locally in a short market. However, plainly what was intended here was to catch out private traders that had procured maize (including in cross-border trade) during the peak harvest months of April-June, and by not allowing them to respond to the government tender force them to sell quickly in local markets. However, prices were by then beginning their upward surge, and the size of trader stocks after a poor harvest was probably lower than government thought might be the case. The maize crisis was worsening and demand for maize from ADMARC at MK17 far outstripped the agency's ability to supply, so rationing was once again brought in at 10kg or 25kg per household. Various food aid relief distributions were going on, but these had little impact on the overall market, and prices continued to rise.

By August 2005, informal cross border trade which had to some extent been holding the market in check during and after the harvest began to dry up. This is because adjacent countries had themselves had relatively poor harvests, and their own prices were rising to reflect local shortages. Meanwhile the imported supplies under the 100,000 ton tender were slow in being mobilised and faced transport bottlenecks. As had occurred back in 2001-02, Malawi was not the only country in the region seeking to secure additional supplies, and competition for supplies and for trucks slowed the delivery process down, as did the failure of some SADC contractors to fulfil their obligations. By December 2005, the national average market price had reached MK34, while ADMARC was selling its dwindling stocks at half this price. In January 2006, the government banned private traders from selling maize in local markets, leaving ADMARC as the sole maize seller at a moment when it had no further stocks of maize to sell. In response, prices rocketed, reaching MK42 in January and peaking at MK51 in February.

One ameliorating factor in this situation was an experimental call option that the government had put in place with the assistance of DFID and the World Bank, which was used to import 60,000 tons of maize that was entirely distributed as humanitarian assistance and did not enter either public or private marketing channels. The delivery performance of this maize was significantly better than that of the other 100,000 tons that the government was trying to procure, and, moreover, the call option saved the Malawi government between US$50 and 90 per ton, due to price rises for South African white maize that had occurred by the time the call option was exercised (Slater and Dana, 2006). In March 2006, prices began to fall. By then it was clear that the forthcoming harvest was going to be very good, and, of course, harvest starts in late-March in the south of the country. Moreover, by then also, some of the government's 100,000 ton import tender was beginning to arrive in the country. Prices fell steeply through the harvest season, reaching amongst the lowest prices in real terms of the entire decade in June 2006. The abundant supply that then prevailed also meant that the seasonal price spike in 2006-07 (peaking Dec 2007) was one of the lowest on record (prices rose just 21 per cent in nominal terms from June 2006 to Dec 2007).

One of the reasons that the 2005/06 price episode did not result in a famine as in 2001/02 is that considerably more prevalent and diverse humanitarian operations were going on throughout the country in 2005, as compared to 2001. The Malawi Vulnerability Assessment Committee (MVAC) had come into existence, and was using household economy assessment (HEA) methods to predict food balances in different zones according to the production and purchasing power of local populations. Moreover, the Malawi Social Action Fund (MASAF) was conducting widespread food-for-work or cash-for-work programmes in parts of the country thought to be food insecure. This allowed many families to cope slightly better with spiralling prices than would have been the case in 2001. Nevertheless, the adverse effect on food intake and nutritional outcomes of allowing prices for the main staple to spiral in this way should not be underestimated. In addition, many of the same mistakes were made as in 2001: complacency and slowness on the part of government in responding to early signs of likely shortage, implementing a ban on private maize sales that caused prices to shoot up, and discounting the usefulness to the country of the free movement of maize in border areas (from which Malawi gains far more than it loses in every season).

One perhaps unexpected outcome of the events of 2005-06 was the formation of a Grain Traders and Processors Association (GTPA) in 2006. This was an initiative encouraged by donors to create a forum where larger-scale private traders, the government, donors and NGOs could engage in constructive dialogue about maize policy (GTPA, 2006). The association was registered under the Trustees Incorporation Act of Malawi, and received some initial funding from the Technical Secretariat of the Ministry of Agriculture and Food Security, and the Regional Agricultural Trade Expansion Support (RATES) Program. The GTPA is an association of agricultural suppliers, processors and traders in food commodities, especially maize (WFP, 2008). It also has non-trader 'individual' members from stakeholder groups, including members of parliament. The government has worked in harmony with the association on some occasions, but not on others (examples follow). It has on occasions utilised the GTPA to manage the tender process for contracts of maize delivery to NFRA.

The Maize Price Spikes of 2007-09

A number of researchers have examined the maize price spikes of 2007-09 (Jayne *et al.,* 2008b; Revenga, 2008; Wodon and Zaman, 2008; Jayne and Tschirley, 2009; Rapsomanikis, 2009). Events began with the government lifting the export ban on the maize that it had imposed in July 2005. At this point predicted production for 2007 was 3.4 million tons (later revised down to 3.2 million), and prices were falling towards their lowest level in real terms since the year 2000. Indeed, the price trough in 2007 at MK14.61 was just 8 per cent in real terms higher than the lowest price in 2000. Initially the government issued licenses to private traders for 80,000 tons of maize to be exported. This was followed in May 2007 by a contract to supply Zimbabwe with 400,000 tons maize by the end of February 2008. If production figures were accurate these quantities should have been accommodated easily from the surpluses of the two seasons, roughly estimated at 1.4 million tons (Table 6.3 above).

NFRA signed supply contracts with private traders close to 240,000 tons in May, and by the end of the month some 50,000 tons of the contract had been fulfilled. ADMARC began buying maize at MK17 in June, but lacked financial resources to expand purchases rapidly. At this point the ADMARC price was above the market price, and traders and farmers would gladly have sold to ADMARC as much grain as the agency could take. In June also the government declared that it would supply 40,000 tons maize to Swaziland. By the end of July, a cumulative total of 114,085 tons of maize had been supplied to Zimbabwe and prices were just beginning to start their rise into the lean season. In ensuing months, exports remained a key feature of the market, with WFP purchasing 32,363 tons to deliver to Zimbabwe, the government donating 10,000 tons to Swaziland and Lesotho, and the main Zimbabwe contract reaching 267,000 tons at the end of November.

However, in the domestic market prices were indicating that surplus maize was not as prevalent as the headline figures would suggest. Prices moved up sharply, and ADMARC reverted to rationing maize at 25kg per person since it had been unable to procure sufficient maize at MK17 to cover demand at this price. ADMARC began bidding for maize against private traders, upping its purchase price to MK20. By January 2008, the market price was MK34 and ADMARC was permitted to raise its selling price to consumers to MK30. Exports to Zimbabwe continued and stood at 298,292 tons on 13 January 2008. Domestic prices continued to rise for the following two months, peaking at MK43.53 in March 2008, just before the next harvest. By then, too, supplies to fulfil the Zimbabwe contract had dwindled, and in the end just 302,000 tons of the original 400,000 ton contract was fulfilled.

It is difficult to reach any other conclusion around these circumstances than that the production level of the 2007 harvest was seriously overestimated. If all known export obligations are summed (taking Zimbabwe at its final level of 302,000 tons), then export volumes were not more than about 425,000 tons. This compares with an estimated maize surplus of roughly 1.4 million tons over two seasons. It would take enormous adjustments in consumption or loss figures to account for a 'missing one million' tons, and of course if these were done for a single year, the manner of doing them would also have to apply to previous years, for which no such massive discrepancies in figures have been detected.

The 2007-09 story is not, however, complete. The second round 2008 harvest figure was lower than previous forecasts, but nevertheless came in at an estimated 2.9 million tons (later revised down to 2.6 million tons). By this time, of course, the critical comparison was with the preceding year estimate of 3.4 million tons, rather than with past years, and the 15 per cent predicted decline was significant for both government's and traders' views of the market. In April 2008, the Ministry of Trade and Industry re-imposed an export ban on maize and maize products. Prices at that stage were still falling as the harvest came in, but not steeply, and they levelled out at MK32.8 in May 2008. When ADMARC entered the market at around this time, it adopted a competitive maize price system in which it procured maize at differing prices at different buying points depending on trader prices. This initiated an initial scramble for supplies, and an early start to the lean season upward price trend.

In May 2008, the government decided to enforce a maximum buying price for maize of MK28 per kg, and required all buyers of maize to purchase a license. The license was to be procured from MoAFS upon the recommendation of the GTPA. The license was commodity specific in that if any company or individual was interested in buying maize, or any other crop, they had to buy a license specifically designated for that crop. The license stipulated the name and address of the buyer of the license. It was valid from the date of issue until 31 March 2009 and was issued under the provisions of the Agriculture (General Purposes) Act 1997 and the Smallholder Agricultural Produce (Marketing) Regulations 1987. The buying license was subject to the following conditions: the minimum price to be paid for one kilogram of food maize under the license was MK28 per kg, the weighing scales used were those assized by the Malawi Bureau of Standards, and were to be made available for inspection at the market point, the buyer was to provide fortnightly food maize purchase returns to GTPA, the buyer was to use properly identifiable farmer cash sale receipts and was to display a GTPA membership certificate at each market centre. The license was liable to suspension if the holder failed to comply with its terms and conditions. The use of GTPA as an institution to endorse the issue of licenses effectively gave discretionary powers to a trade body, which was somewhat unusual. The government justification for doing this was that it wanted to monitor the statistics of produce purchasing; however, since not all traders were members of GTPA, the conditionality essentially forced market participants to become members of the trade body if they wished to continue trading.

However, in the same month, the average maize price in Malawi was MK32.83 and in June it moved sharply upwards to MK37.94. In addition, in June 2008 ADMARC started buying maize from traders at between MK50 and 60, and NFRA was in the market procuring maize at MK65. In rural markets, ADMARC was purchasing from farmers above the stipulated maximum price, and selling maize at MK40 kg. By early August 2008, despite strenuous efforts, ADMARC and NFRA combined had procured only 60,000 tons, which by previous experience was far too low a stock to meet demand through the lean season to March or April 2009 (Jayne *et al.*, 2008b, p.16).

On 21 August 2008, the government revoked its previous licensing agreement with the GTPA, and outright banned the private purchase and sale of maize, making ADMARC in effect the sole buyer and seller of maize at fixed prices of MK45 and MK52 respectively. The idea was to force private traders to release their stocks (by sale to ADMARC) causing prices to fall to these levels. Private traders were given one month to sell their grain stocks to ADMARC; however, it is unclear how failure to do this would be policed. An inadvertent effect of the ban was to curtail the flow of cross-border imports, thus reducing potential maize supply in the market further. Between August and September 2008, informal cross border trade was estimated by FEWSNET monitors to fall by 67 per cent from 8,540 to 2,185 tons. In September, a clarification was issued exempting small-scale traders from the ban (*The Daily Times* 15 Sept 2008; FEWSNET, 2008b); however, for cross-border trade this still meant that imports and onward sales could only be done by bicycle or cart, or using back roads and small pickup trucks. Small-scale traders were expected to abide by the minimum buying and selling prices set for ADMARC.

These actions failed of course to stem the rise in prices, although they did create a slight dip in the weeks immediately after the measures were taken, presumably because some trade occurred in this period within the ADMARC price range. However, institutions trying to procure maize for food security purposes such as large international NGOs and WFP found they were unable to secure grain below the ADMARC selling price. The GTPA requested permission from the government for licenses to undertake commercial imports, but these requests were turned down even though domestic prices were by then above the border cost of imported supplies. By November 2008, the average market price of maize had risen to MK57.8, and a familiar sequence of events occurred in which ADMARC started rationing its diminishing stocks to 10-25kg per transaction at its official sales prices. In available data, there is something of a disjuncture between what was occurring to prices, which eventually rose to MK70.6 in February 2009, and a claim that the stock position of ADMARC and NFRA was robust with holdings of

23,500 and 96,000 tons respectively. If the stock position was this strong, it is difficult to see why these stocks were not urgently released to market in the Nov-Feb period.

In March, not surprisingly in view of harvest forecasts, prices began to decline from their peak, but this only gathered momentum in April 2009 by which time the new harvest was well under way. The forecast from MoAFS was for a 2009 production level of 3.7 million tons, a new record in a period of four years that had already seen all previous records broken twice. Nevertheless, on 6 April MoAFS issued a press release informing the public that the ban by government on private maize purchases from farmers was still in force, and ADMARC was the sole buyer and seller of maize. The release also advised all agricultural dealers, processors, school and hospitals to buy only from ADMARC markets. Any maize not bought from ADMARC risked to be forfeited and handed to ADMARC without compensation (Malawi, 2009a). In 17 April 2009, MoAFS issued another release stating official buying and selling prices of maize at MK50 and MK60 respectively. However, ADMARC did not enter the market as a purchaser itself at these prices. Instead, another directive occurred in July 2009 that set these official prices at MK40 and MK50. However, average market prices were lower than these official prices throughout this period.

Again, as was commented for the 2005-06 price spike, the fact that famine did not occur in the 2007-09 run up of prices, does not mean that these extraordinary price levels did not have distressing and harmful effects on the rural poor in Malawi. In fact, quite the contrary, for every one of the price hikes in the 2000s, FEWSNET reports the same pattern of adverse coping strategies occurring in each case: diminishing daily food rations (if necessary down to one meal a day), recourse to unconventional and wild foods (including maize husks), desperate search for *ganyu* work at low wage rates, sales of livestock at low prices and so on. A famine, when very large numbers of people die of starvation, is an extreme event; but there are plenty of gradations in terms of severity of food insecurity that people may have to confront before the situation deteriorates to famine status, and each one of these adverse price episodes in Malawi is likely to have taken significant proportions of the rural population to the brink of disaster.

The 2007-09 price spikes in Malawi were highly political. The government had essentially staked its political reputation at home and abroad on the success of the fertilizer subsidy under the AISP from 2005 onwards. After reporting two successive record harvests in 2006 and 2007, President Bingu wa Muthalika received several awards from the international community: the United Nations Global Creative Leadership Award; and the first Food, Agriculture and Natural Resources Policy Network (FANRPAN) for food security policy award. He was also honoured at the August 2008 African Green Revolution Conference for the country's success in promoting food security (Jayne and Tschirley, 2009). In the light of these accolades, as well as domestic politics and an impending election in May 2009, it was inconceivable for the government during 2008 to have admitted miscalculating the size of recent harvests, or permitting commercial imports into the country.

Recurring Patterns of Crisis and Response

All three extreme price episodes in the 2000s exhibit remarkable patterns of similarity between them in the way crises arise, and the format of the policy responses that occur. These patterns are helpful for discerning the public-private coordination problems that result in crises that are exacerbated rather than ameliorated by actions taken. They are also helpful for understanding the political reasons why such crises arise and recur. The basic configuration that occurs seems to be much as follows:

(a) a fully supplied market is declared, or exists from a previous good harvest;

(b) politically, there is an unwillingness to shift from this position, especially when substantial political capital has been expended 'solving' the maize supply problem in preceding crop seasons;

(c) this political obstinacy becomes exaggerated when national elections are at stake, and any admission of having failed to achieve the maize food security goal or having to modify the approach to achieving it, is regarded as a fatal sign of weakness that would be exploited by political opponents;

(d) when market prices fail to concur with the declared abundance of supply, the first fallback position is to blame private traders for hoarding, and to seek to curtail their operations;

(e) typically also, NFRA and ADMARC are asked to redouble efforts to procure grain in a tightening market;

(f) when prices continue to rise, exports are banned, and private trade in maize is banned (this occurred in all three price episodes of the 2000s);

(g) ADMARC/NFRA are reinstated as monopoly buyers and sellers of maize at fixed prices decreed by government;

(h) ADMARC/NFRA fail to procure sufficient maize to cover lean season deficits because prices rise above the official purchase price level, and anyway surplus maize is not actually available to procure;

(i) ADMARC resorts to selling in small quantities, partly to conserve limited stocks, and partly to prevent private traders from purchasing large quantities at official sales prices to sell onwards at the much higher market prices;

(j) eventually, imports are ordered when the situation becomes so dire that this cannot be avoided (this did not occur in all episodes);

(k) imports arrive late due to procurement and delivery delays;

(l) in the background, there are persistent long run problems with the size of public stocks, including the appropriate strategic level of the stock, the turnover of the stock to keep the grain edible, and the avoidance of theft and corruption on the part of stock managers;

(m) in nearly all crises, the stock turns out to be much lower than was formerly thought;

(n) in nearly all crises, the stock after the crisis is substantially too high, due to either (late) imports or domestic procurement vastly exceeding target stock quantities;

(o) prices typically begin to fall when the next harvest is in prospect, and the steepness of the fall is intensified if late imports are arriving at the same time as the new harvest comes in.

In seeking to understand how this particular pathology keeps replicating itself every few years in Malawi, a first point to note is that market prices are the most accurate single indicator of the true maize availability position in Malawi at different points of the year. As we have seen in Chapter 5, and is confirmed by many other researchers, the maize market in Malawi is fundamentally a competitive market, with plentiful and diverse traders operating in it, and efficient spatial arbitration going on reflecting local surpluses or scarcities. The market price is a more accurate predictor than production estimates that seem to have performed variably in indicating the volume of maize available from the domestic harvest from year to year. However, the market price is not seen as a critical indicator in the food security policy conversation in Malawi. Rather the emphasis is on the maize harvest figure, the crop estimates for substitute foods (rice, cassava), the stock position, food aid operations, and localised vulnerability identified by MVAC investigatory procedures.

Second, most government reflex action exacerbates rather than ameliorates market scarcity, as indicated by prices, lending some support to the 'Jayne hypothesis'. Aggressive procurement by ADMARC or NFRA in a short market, sometimes even trying to outcompete traders on price, just stokes prices up further. Banning traders from the market likewise, since this reduces spatial arbitration, and, crucially reduces the volume of informal cross-border trade (which is handled entirely by private traders). In every single maize shortage episode of the 2000s, cross-border import trade has helped a crisis from turning into a catastrophe. In every single episode except, perhaps, the last, the government has held an exaggerated view of the volume of stock holding ('hoarding') by the private sector, and efforts to get this stock released through punitive action have not added much to supply. This is because such stocks are small relative to the size of the market, and almost certainly much less important than cross-border trade volumes. In September 2008 there was a short-lived price reduction effect of the outright trader ban, probably because some traders did decide to sell their stocks to ADMARC at MK45 rather than face disposal difficulties later in the year. However, this did not alter the underlying maize shortage position, and prices resumed their steep upward rise in November.

Third, the ambivalent understanding of the private sector within the public sector domain is a powerful thread running through all crises. This is partly political (the private sector provides a convenient scapegoat when things are going wrong), and partly the result of misjudgement of private sector capability to manipulate stocks and supplies in a competitive market. It is difficult to see that there can be much collusion in the Malawi maize trade private sector (Myers, 2008). There are too many players, even at the large end of the market, and these actors have differing interests and objectives depending on whether they are traders, millers, or food processors, and in what combination they undertake different activities. Of course private traders take informed bets on future prices in deciding how rapidly they release purchases from farmers into the market. Of course, also, private traders will take advantage of price differentials created by public decisions (if they can secure maize from ADMARC at a low price and sell at a high price in the open market, they will do so). But none of this means that the private sector can 'create a shortage' if there is actually sufficient maize around to satisfy consumption needs at prices that reflect intra-seasonal storage costs. It follows that the only way to bring steeply rising prices to a halt is to increase market supply (by releasing stocks or importing), not by banning private trade.

Fourth, maize stock holding for food security purposes in Malawi has an unhappy history. It has never worked particularly well, and the separation of powers between ADMARC and NFRA seems to have done little to improve the situation. The suspicion has to be that maize stocks are just too enticing a target for neo-patrimonial manipulation to operate in an entirely technical role in the food security landscape. The public stock history of the 2000s veers erratically between excessive stocks that then run down and disappear in a matter of months, and strangely low stocks at the start of seasons that turn into food security crises because there is not enough maize in the market. It is recognised that stock management is a difficult balancing act, especially given uncertainties regarding the ease of domestic procurement, and the difficulty of securing import permissions. Nevertheless, there seem to be unresolved factors at work regarding the stock operations of both ADMARC and NFRA that are not just to do with technical competencies.

Fifth, the organisation FEWSNET seems to play a curiously compromised role in the food security debate and opinion forming that occurs around maize availability in Malawi. FEWSNET is an independent regional organisation, funded by USAID. As its name suggests it has its origins in earlier famine early warning systems (FEWS) in southern African countries, but it takes advantage of new technologies to collate and analyse food security data rapidly, and to post the latest information on its website.

FEWSNET has offices in each of its member countries, and therefore one in Malawi. It produces monthly Food Security Updates, as well as Outlooks covering six months ahead, and alerts if a food security crisis seems to be looming. FEWSNET provides an excellent sequential source of information on the evolving food security situation in a country like Malawi, and its documents are the primary source for much of the evidence compiled in this chapter (as is also true for other researchers). Yet examining FEWSNET monthly reports in sequence across a decade, it is striking how rarely their analysis is prepared to differ in its interpretation from whatever is the government stance at that moment in time.

It becomes apparent that FEWSNET rather uncritically synthesises data and briefing notes issued by MoAFS (in the Malawi case) and adopts the line that is transmitted by the source Ministry. This is most evident in the period 2001 to 2003, where FEWSNET was still saying that 'maize is readily available in the local markets' in December 2001 (FEWSNET, 2001b). This switched in January 2002 to 'even though Malawi has a national *food* surplus in 2001/02, it has a large *maize* shortage' (FEWSNET, 2002, italics as in original). This was the origin of the widespread misconception in early 2002 that Malawians only had themselves to blame if they were going hungry, because they were unwilling to switch to other foods (this is debunked neatly in Devereux, 2002). Then later, in 2002 and for the following year, the story switched to a 600,000 ton food deficit, which was also the government line, and eventually resulted in an enormous oversupply and the sale of stocks at huge losses.

6.4 Brief Summary and Some Observations on Maize Production Estimates

In summary of the principal findings here, this chapter examines three episodes of extreme seasonal price instability that were experienced in the Malawi maize market in the first decade of this century. Prices, maize volumes, and sequences of events are carefully traced (to the extent this is possible to do), and patterns of experience common to these episodes are identified. The strongly political character of maize policy decision making is emphasized, and this is plain to see not just in the character of decisions taken, but in public statements made. There seems to be quite a marked pathology to these price crises, in the sense that rather predictable stances are almost always adopted in the same direction, and with the same deleterious consequences. The chapter provides diverse evidence to support the 'Jayne hypothesis' that governments have a tendency to stoke up incipient price crises by implementing policies that exacerbate supply shortages in markets.

It also seems that despite enormous efforts on the part of donor organisations to improve food security information (including support to the MVAC), lessons around the fundamentals of how markets work, and how they can be better managed, are not properly drawn from each episode, so the same mistakes are made again and again. At the centre of this state of affairs is a fundamental public-private coordination problem, based in part in politics but also in a misunderstanding about how the private sector works and the most appropriate way to set limits around the outcomes of private decisions. The next and final chapter of the thesis considers this problem in greater detail.

However, before moving to the conclusions of the thesis, a comment is warranted at this point on the veracity of production data in Malawi. It is recalled from the preceding narrative account of the 2007-09 price spikes, that these occurred despite, on paper, there being abundant quantities of maize available in the domestic market in that period. It is also recalled that a quantum step up apparently occurred between the first and second half of the 2000s, in which average maize harvests jumped from 1.5 to 3.0 million tons, with the new much higher production levels being associated with the Agricultural Input Support Programme. Prices, however, tell a different story. They suggest that the 2005/06 harvest may have been ballpark accurate (Table 6.3 above refers). However, it seems highly likely that the 2006/07 harvest, rather than representing a drive to new record levels, was about the same or perhaps even slightly lower than the preceding harvest (perhaps 2.5 million tons). This in turn would mean that the 2007/08 harvest may have been lower still at 2.1 or 2.2 million tons, and the 2008/09 harvest perhaps a new record at around 2.8 to 3.0 million tons. Taking all these admittedly rather crude inferences together, it is possible that the average annual harvest in the late 2000s was around 2.6 rather than 3.0 million tons, and therefore there has been 400,000 tons per year less maize in the market than has been suggested by the official production figures.

An alternative explanation is that the consumption trend for maize is higher than predicted in the maize balance sheet. However, if the consumption trend is raised far enough to recreate the shortage conditions in the Malawi maize market in 2007 and

2008, then this creates irresolvable problems for the size of deficits earlier in the decade (they become so large that the build up of maize surpluses in 2002-04 becomes impossible to explain). It is not an objective of this thesis to attempt to pin these circumstances down further, but the careful examination of year to year events and trends during the 2000s of this chapter does suggest a substantial exaggeration in the absolute level of recent maize harvests (see also Jayne *et al.,* 2008b; Jayne and Tschirley, 2009), which in turn has implications for the costs and benefits of the AISP. If these inferences have any merit, the situation they describe could also create problems for managing adverse food security events in the future, since a persistent overstatement of maize availability is now built into food balance sheets, and into future production trends.

Chapter 7 : Findings and Interpretation

7.1 Introduction

This thesis set out to examine seasonal price instability in the maize market in Malawi over the 21-year period from 1989 to 2009. The thesis does not suggest that this is a new topic, or that other researchers on food policy in Malawi have neglected the price seasonality dimension. However, seasonal price instability is rarely the central focus of attention in the work of other researchers. It is commonly one amongst several factors that are taken into account when examining another topic, for example, spatial price efficiency (Myers, 2008), or international price instability (Rapsomanikis, 2009), or price variation in relation to regulatory regimes (Chapoto and Jayne, 2009). The contribution of this thesis is to provide a systematic exploration of seasonal price instability of the kind that can provide benchmarks or reference points against which to compare maize market behaviour in a particular year or sub-period both contemporarily and in the future.

That seasonal price instability is a significant food policy issue in Malawi is without dispute. As discovered in Chapter 4 of the thesis, the seasonal margin between the lowest and highest maize prices across the crop year averages 60 per cent in Malawi. However, there are recurrent extreme price volatility episodes when lean season high prices can be 2-300 per cent above post-harvest trough prices. There were three such extreme price episodes in each of the decades of the 1990s and 2000s, meaning that in the recent past they have occurred roughly every three years. Extreme price volatility has long been recognised as a problem for agricultural efficiency and growth because it makes production planning by farmers more difficult, and it reinforces a subsistence orientation in food agriculture due to the high risks it implies for engagement in the market. More recently, however, it is the deleterious consequences of such episodes for the food security of food-deficit small farmers that is regarded as the most serious adverse economic impact (Byerlee *et al.*, 2006; Myers, 2006). In Malawi, extreme adverse price episodes are associated with widespread food insecurity in rural areas, hunger, and in at least one episode in the 2000s, starvation and famine (Devereux, 2002).

The thesis is situated in a body of literature about food markets and how they work in eastern and southern Africa, and it is one of the purposes of these conclusions to consider the implications of the findings of the thesis for the arguments put forward in that literature. As discussed earlier in the thesis (Chapter 2) there are two broad groups of ideas about the post-liberalisation working of food markets in these regions; although it is also worth emphasising that these groups have fuzzy boundaries, and they overlap regarding many specifics about markets and policy. One group deploys new institutional economics ideas in order to emphasize the transaction cost and coordination failures of privatised markets in weak institutional settings (Dorward *et al.*, 2005b; 2004a; 2009a). The policy emphasis that follows is a continuing important role for the state in strengthening institutions and facilitating coordination before private markets can be relied upon to deliver agricultural services effectively and efficiently. The other group emphasises the partial character of liberalisation, with private actors being hampered in market development by unpredictable short term policy switches by public decision makers (Jayne *et al.*, 2002; 2006; Jayne and Tschirley, 2009). The policy emphasis that follows is that the state should withdraw further, and should seek to make its interaction with the private sector rule-based, consistent, and predictable.

This chapter returns to these ideas in due course, as part of the purpose of interpreting the thesis findings. Specifically, the thesis ends up by having quite a lot to say about public-private coordination failures, and the chapter seeks to link this to recent papers by Jayne and Tschirley (2009) and Tschirley and Jayne (2010) that set out a framework for achieving a better understanding of such failures. However, before turning to these matters of interpretation, the chapter first provides a summary of the main findings emerging from the empirical research of the thesis.

7.2 Findings about Seasonal Maize Price Instability in Malawi

It is recalled from Chapter 1 that the thesis put forward an overall objective of achieving a detailed understanding of maize price instability in Malawi, broken down into a number of subsidiary research questions. These questions are reproduced here for convenience. In terms of the structure of the thesis, questions (a) to (c) are grouped, and are all treated in Chapter 4 of the thesis. Research question (d) is examined in Chapter 5, and question (e) in Chapter 6.

The research questions were:

(a) what is the underlying, long term, character of seasonal maize price instability in Malawi, during the 21-year period 1989-2009?

(b) is there a detectable trend in the extent of such instability, and does the degree of instability vary between markets in different parts of the country?

(c) how does maize price instability compare to that of other food crops over the same historical period?

(d) what lessons can be learnt from the functioning of private maize trade in Malawi that may shed light on patterns of price instability, especially with respect to competition, choice, market structure, and spatial price behaviour?

(e) examining 'events' of extreme maize price fluctuations in Malawi in the 2000s, what can be learned about the influence of world markets, state regulatory behaviour, public-private coordination, and the politics of public decision making in helping to explain the prevalence and intensity of such events?

The difference between trough and peak prices in an agricultural season for an annual crop is regarded in marketing analysis as the gross storage margin. It corresponds to the intertemporal function of crop marketing in which the sale of the commodity to intermediate or final consumers takes place in a different period to the purchase of the commodity from farmers. The gross storage margin represents coverage of the costs of holding the commodity in stock for varying periods, together with a competitive net margin representing a rate of return on the capital deployed.

Finding 1

The gross storage margin for maize in Malawi averaged 60 per cent in the period 1989-2009. This finding is robust; the seasonal peaks and troughs expressed in index form have low standard errors and represent statistically significant departures from a null hypothesis of no price seasonality. A storage margin for maize of this magnitude has also been observed in other settings (Timmer, 1986a).

Finding 2

Maize price seasonality has neither increased nor decreased in the observation period. The price index and gross margin data were examined for the presence of trends, and no significant trends were detected using two alternative methods.

The period under consideration was one of very substantial change in the policy environment for food crops in Malawi (documented in Chapter 2). Food crops were first opened up for private trading in 1987, after more than two decades of being confined to the state trading corporation ADMARC or its predecessor organisation. During the 1990s, initial quite strict limitations on the flexibility to engage in private trade were lifted, and small scale trading at the local level blossomed. Inevitably, due to its strategic importance, the maize market has continued to receive a lot of attention from politicians and civil servants, and the rules governing private trade in maize have been altered frequently, including outright trading bans in some crop seasons. Other food crops liberalised at the same time have been less prone to frequent rule changing, and it is germaine to the study of maize price instability to examine how these other crops have fared with respect to price seasonality.

Finding 3

Other food crops exhibit less price seasonality than maize. For the same historical period, groundnuts were found to have an average seasonal gross margin of 43 per cent, beans 33 per cent, rice 22 per cent and cassava 9 per cent.

Finding 4

Other food crops display evidence of declining price seasonality. Specifically, beans and rice exhibit significant downward trends in the size of their gross storage margins, utilising two different descriptive methods for measuring this.

In terms of the size of average seasonal gross margins, these contrasts with maize are due in part to differences in the growing seasons and harvesting options for other food crops. These offer more leeway than maize for varying the harvest period and obtaining more than one crop across the calendar year. For rice this is due to irrigation in some important rice growing areas. Cassava tends to be harvested at different points in calendar for different purposes, and fresh cassava is not stored for any significant duration. With respect to declining price seasonality, a possible explanation for the findings on beans, rice and (less firmly) groundnuts and cassava is that private marketing of these crops has become more competitive and efficient over the past 21 years, while not incurring the same erratic and disruptive policy interventions as maize (such as total bans on private trade).

An important dimension of price seasonality in maize is variation in gross seasonal margins in different locations in Malawi. On grounds of microeconomic theory, it is not expected that seasonal margins would converge towards the same magnitude in different parts of the country. The size of the margin will vary according to the relative abundance of maize offered for sale at harvest time (causing low trough prices) and the relative lack of maize available to purchase at the height of the lean season (causing high peak prices), mediated by transport cost considerations. According to this logic, the highest seasonal margins are likely to occur in remote rural areas (thus, high transport costs) that both produce a high surplus at harvest time and experience a food deficit in the lean season. In Malawi, a significant factor adding to downward price pressures at harvest time in some locations is informal cross-border maize imports, estimated to have averaged 106,000 tons per year in the 2000s.

Finding 5

Price seasonality for maize varies considerably between different locations, in the range of 45 per cent for markets near cities or on main roads, to 90 per cent for surplus producing remote rural areas. In other words, the basic economic deductions are corroborated. A vulnerability implication is that maize-deficit small farmers located in high maize harvest areas confront considerably worse terms of trade between their selling and buying prices than do farmers in maize deficit areas or those located near cities or main roads.

Finding 6

In all probability, informal cross-border maize trade exacerbates seasonal price troughs in maize growing rural areas close to border crossing points. This finding is not strictly verified, but it follows from the logic underlying *Finding 5*, and was observable in maize price behaviour in one of the case-study villages, Mission village, described in Chapter 5. The biggest and most consistent border maize import flows into Malawi occur from adjacent maize growing areas in Mozambique.

In view of the 'global food price crisis' that occurred in 2007-08, the question arises whether seasonal maize price instability in Malawi is influenced by trends and events in the international maize market. The answer to this seems to vary between the short- and long-term, with short-run price behaviour occurring independently of international market trends, but convergence occurring with a lag of six months or more

(Rapsomanikis, 2009). It has been noted for Malawi (as well as for Zambia) that in the 2000s domestic maize prices have been rising towards import parity, such that undue upward seasonal price spikes can go measurably above import parity (Jayne *et al.*, 2008b).

Chapter 5 of the thesis examined the conduct, structure and performance of the maize market in Malawi, utilising fieldwork with farmers and traders for the first two dimensions, and the econometric method of cointegration in order to study spatial market efficiency. The fieldwork components of this empirical research possessed recognised limitations. It comprised a one visit survey in three purposively selected maize producing villages in each of Malawi's three regions, as well as key informant interviews with actors in maize marketing chains. The 2008 harvesting season, which is when the fieldwork was conducted, turned out to have substantially lower harvests than had been predicted by official crop forecasting procedures, and some aspects of the fieldwork methodology became less viable because farmer respondents were not selling maize.

Finding 7

Maize trading in Malawi is highly competitive at local levels. The research found numerous and diverse traders occupying every conceivable niche in the primary procurement of maize from farmers; and farmer respondents nearly unanimously stated their sales behaviour as spot selling to the highest bidder. This contrasts with an alternative scenario quite often found in rural areas of low income countries where farmers are locked into pre-arranged sales agreements with traders to whom they are in debt, or sell only to trusted individuals with whom they have formed long term exchange relationships.

Finding 8

Overall, private maize trading in Malawi is competitive, with neglible prospects for collusion by traders, even at more aggregate levels of market participation. The research triangulated observations about the working of the maize market through key informant interviews with a range of larger market participants. Larger operators are not a uniform group. Some are purely traders and storage agents, some are millers who depend on sales of maize flour, and some are specialist food or drink manufacturers (for example, Chibuku Products Ltd.).

According to Myers (2008), speculative hoarding is a most unlikely occurrence in a competitive market with few barriers to entry. This is because it is difficult to make excess (collusive) profits by holding additional stocks. Buying maize to build such stocks bids up current prices, and the additional stocks themselves represent risky outlays that may not be recouped in later sales. Later, when the stocks are sold, the stock releases will depress prices below what they would otherwise have been. Thus too much storage (i.e. hoarding) has the effect of reducing returns to storage, not increasing them, and only those who sell early, before the majority of stocks are released, are likely to profit.

The fieldwork yielded other insights, subject to reservations about their generality due to limitations already stated above and in Chapter 5. One pertinent insight was the significance of distress sales for creating conditions in which poor farm households in maize surplus areas get into food security difficulties later in the year. Another was the near absence of losses in storage as an issue at farm household level, despite claims to its considerable significance in government and FAO documents (wherein figures as high as 30 per cent losses in store can be found) (Jayne *et al.*, 2008a). A high degree of competition does not necessarily translate into efficiency of maize marketing across geographical space. This requires spatial arbitrage by traders (the unimpeded transport of maize from places of surplus to places of deficit until price differences become too small to make this worthwhile). In the absence of knowledge about trade flows, market integration i.e. the adjustment of prices to each other across markets is regarded as the best indicator of spatial market efficiency. The econometric method of cointegration was applied to time-series monthly price data in 13 different markets for the same period as the seasonality analysis (1989-2009).

Finding 9

Cointegration analysis demonstrates that the maize market in Malawi is spatially efficient. This corroborates the findings of other researchers, in particular Myers (2008) who obtained the same result using threshold auto regression methods applied to weekly price data. In the analysis conducted for this thesis overall cointegration between markets was established; however, with weaker links between distant markets. Grouping of markets regionally, between northern, central and southern markets displayed strong market integration within each group, and price behaviour in market pairs consistent with spatial arbitrage.

The findings demonstrate that private maize trading in Malawi works well have substantial policy significance, and are central to the problem of private-public coordination in the management of the market. In particular they mean that maize price responses to shocks are not caused by market failures resulting in imperfect market functioning in different places or times. Rather they reflect real underlying shortages of maize supply, and the duration and intensity of unusual seasonal price spikes reflects a failure on the part of decision makers to grasp and to address the magnitude of the overall lack of maize in the market. In order to obtain a better understanding of the role of non-economic factors in contributing to extreme seasonal price episodes, Chapter 6 of the thesis examines the three such episodes of the 2000s in detail, including a sequential narrative account of the unfolding of each price crisis as it occurred.

Finding 10

Extreme seasonal price spikes in Malawi follow similar patterns, distinguished by the dominance of political over economic considerations, and a pervasive distrust of the private sector on the part of politicians and civil servants. Each price spike contains the following elements: political unpreparedness to acknowledge a maize shortage; state agencies (NFRA, ADMARC) redouble efforts to secure supply in a short market; private traders accused of hoarding; maize exports banned; private trade in maize prohibited; ADMARC reinstated as monopoly with fixed buying and selling prices; failure to rebuild public stocks; delays in ordering imports.

Finding 11

The market price is the single most accurate indicator of the underlying maize supply situation in Malawi (a conclusion that should follow anyway from findings about competition and efficiency in the maize market). However, the market price is not seen as a critical indicator in the food security discussion within government; and between government, donors and NGOs in Malawi. Rather the emphasis is on the maize harvest figure, the crop estimates for substitute foods (rice, cassava), the stock position, food aid operations, and localised vulnerability identified by MVAC investigatory procedures.

The narrative investigation of price spikes in the 2000s leads to serious doubts being cast on the size of maize harvests in the late 2000s, since the AISP was introduced. The official production data shows a near doubling of maize output between the early- and late-2000s, from 1.5 million tons (average 2001 to 2005 harvests) to 3.0 million tons (average 2006 to 2009 harvests). Since consumption trends for a staple food like maize tend to be fairly stable, any feasible consumption trend for the 2000s results in a balance between production and consumption that veers from huge deficits in the early-2000s to huge surpluses in the late-2000s. The deficits seem reasonably plausible, given the size of import operations needed to recover from a deficit market in particular years in the mid-2000s. However, the surpluses indicated since 2006, cumulatively amounting to 3.2 million tons, do not seem plausible given that maize prices rose from MK15 to MK70 from June 2007 to February 2009.

Finding 12

Price behaviour in the late-2000s suggests a substantial overestimate of the size of maize harvests in Malawi, dating from the 2007 harvest. This probable overestimation of production has been hypothesised by other researchers (Dorward *et al.*, 2008; Jayne *et al.*, 2008a; Jayne and Tschirley, 2009). It has important implications for future food security policy discussion, since the entire baseline for year-to-year comparisons has undergone a quantum upward shift.

In brief summary of these findings, the thesis verifies a mean seasonal price change for maize in Malawi of 60 per cent. There are individual years when the gross seasonal margin is many times this level. Private maize trade is found to be competitive and efficient, and therefore cannot be cited effectively as a reason for the prevalence of extreme seasonal price events. These instead seem to occur due to a particular pathology in the relationship of public decision making to the private maize market, characterised by politics, mistrust and persistent coordination failures.

7.3 Interpreting these Findings in the Context of other Research

The purpose of this section of the chapter is to link the findings of this thesis to those of other researchers on food markets in eastern and southern Africa, and to see what additional light, if any, is shed on the way forward for managing the maize market in Malawi in the future. A key feature of maize policy in Malawi throughout the past two decades has been the unpredictable character of government policy action, with severe repercussions for the risk confronted by private traders in carrying out commercial operations (purchases, storage, transport, sales). Some components of this unpredictability are as follows:

(a) changing licensing regulations for imports and exports;

(b) banning imports by private traders;

(c) banning exports;

(d) banning private trade altogether, including in the domestic market;

(e) instructing NFRA to source outside the country, so that imported supplies can drive down domestic prices and force traders to sell stocks;

(f) ADMARC sales at prices below market prices;

(g) ADMARC entering the market to procure in competition with private traders;

(h) NFRA and ADMARC redoubling efforts to procure maize domestically when prices have already begun to rise steeply;

(i) ADMARC limiting size of individual sale transactions to consumers, in order to exclude traders from purchasing in volume for resale.

The narrative account of exceptional price spikes provided in Chapter 6 of the thesis showed how many of these *ad hoc* policy decisions exacerbate rather than ameliorate a shortage of maize supply in the market. This is because they act to curtail market volumes, either by trying to procure more maize in a short market, or by preventing a flow of maize into the market from informal or formal imports. Chapoto and Jayne (2009) put forward a hypothesis that the greater the degree of such market intervention, the more unstable will be domestic prices. They test this hypothesis by reference to price time series data in eight countries: South Africa, Mozambique, Uganda, Zambia, Malawi, Ethiopia, Tanzania and Kenya. They find that the less interventionist countries (in terms of frequent changes in maize market regulation) have the lowest price volatility (South Africa, Mozambique, Uganda) while the most interventionist countries have the highest price volatility (Malawi, Zambia). Malawi exhibits the greatest price instability of all the countries examined, on the two separate measures of overall price variation and price variation corrected for average seasonal margins (Ibid., Table 1, p.12).

The findings of this thesis would tend to support the view that it is unpredictable or poorly considered government action that explains episodes of extreme seasonal price volatility in Malawi. Given that almost all researchers agree that private trade in maize in Malawi is competitive and fairly efficient (Jayne *et al.*, 2008a; Myers, 2008), it is difficult to sustain an alternative hypothesis that problems in the maize market are due to weakly functioning private markets with serious coordination defects (between private actors), high transaction costs, and high private risk in thin markets (Dorward *et al.*, 2005a; 2005b; 2009a; 2009b).[29] Rather, private risk is seen predominantly to be increased by state action. Nevertheless, one most important dimension of the 'coordination school' becomes critically important in the policy discussion of the maize market in Malawi, and that is public-private coordination in market management. In particular, the coordination literature points to lack of trust as a critical feature of market failure problems under a wide variety of circumstances (Dorward *et al.*, 2004a; Poulton *et al.,*2006a; 2006b); and in this instance it is lack of trust between public and private sectors that results in persistent and frequent failures in the orderly management of the Malawi maize market.

A framework has been proposed to take forward this problem of lack of trust and coordination failure in the interface between the public and private sectors in food markets (Jayne and Tschirley, 2009; Tschirley and Jayne, 2010). This is referred to as the 'credible commitment problem', and is based on the following five premises:

(a) "government and traders interact in the same political and economic space but with differing objective functions;

(b) the two are dependent on each other in that the behaviour of each affects the outcome of the other;

[29] This is not to dismiss or downplay the existence of transaction cost factors such as lack of trust, absent quality standards, or inaccurate weighing scales; it is just to propose that, weighed in the balance, these are not the factors responsible for major malfunctions of the maize market in the Malawi case.

(c) trust between government and traders is difficult to develop because of differing objectives, values, and world views;

(d) information about the other's behaviour is imperfect, and the effects of some behaviours are seen only with a time lag; and

(e) as a result, each must base their own behaviour in part on expectations about the behaviour of the other." (Jayne and Tschirley, 2009, p.6).

According to this framework, the government has a political objective which is to remain in power (Ibid., p.6). Given the importance of maize to both producers and consumers in the country, being seen to have been responsible for improving the maize market for its participants is critical to political success. These political arguments were rehearsed in Chapter 2 of the thesis, and arose in a significant way in the narrative of food price crises provided in Chapter 6. In particular, gaining political credit for having overcome a previous maize market problem is crucial, as also is not providing political opponents with ammunition to attack the government's record in this area (which often comes down to not admitting a maize shortage, even when one is evident).

By contrast, private traders have the objective to maximise their profits. In pursuit of this objective, they take informed positions regarding future market developments, including decisions as to how much grain to purchase into stock, how long to maintain the stock holdings, and when to release supplies into the market. In a rising market, private traders will seek to procure large volumes early (when prices are still low), and will hold the ensuing stocks while prices continue to rise at a rate that is above weekly or monthly storage costs. This is not bad behaviour and is not collusive hoarding. Private traders will also (if given the opportunity) buy from ADMARC at low prices and sell at high prices when a gap opens up between official and market prices. Again, this is not bad behaviour; it is an opportunity created by a particular form of market management (subsidised sales to consumers by ADMARC). Offsetting these opportunities to make profits in particular market circumstances, private traders also face considerable risks from changes in government behaviour (such as being banned from trading altogether).

The gap between government and trader objectives, and the dynamic of the interaction between them that makes matters worse in a crisis (either traders taking advantage of windfall opportunities to make a profit; or the government deliberately trying to undermine traders' ability to operate successfully in the market) results in the credible commitment problem. This is described as 'the inability of parties to make credible commitments to each other precludes a course of action that would resolve a conflict' (Jayne and Tschirley, 2009, p.6). Examples of this impasse abound in the history of the maize market in Malawi in the 2000s (Chapter 6). For example, in 2005, the government deliberately decided to source imports rather than procure domestically, in order to persuade traders holding stocks to sell or risk future losses when the imports arrived. In 2008, government reneged on an agreement to use traders to supply ADMARC's requirements when market prices rose above the fixed ADMARC procurement price, then promptly banned private trade altogether.

The credible commitment framework seems a useful way of organizing ideas about the public-private coordination problem in food markets in countries like Malawi. It appears to fit the evidence on how this relationship has tended to develop in the post-liberalisation era, and it is consistent with the patterns of experience that occurred at times of maize price crisis in Malawi in the 2000s. Yet, there is something unsatisfactory about the even-handedness with which 'government objectives' are opposed to 'trader objectives' in this framework. After, all private traders are merely doing what entrepreneurs are supposed to do in all branches of the economy, which is to provide an output or service requiring an investment, and with the intention of making a profit. The weight of the empirical evidence suggests that private maize traders in Malawi do this quite well, and are not able to any significant degree to exercise monopoly or monopsony control over market outcomes. The government, by contrast, does have choices regarding the decisions it makes and their effects on the public good.

Jayne and Tschirley (2009) set out three alternative 'models' of staple food market development that arise from their deployment of the credible commitment framework. The first model is the private sector-led model in which responsibilities for procurement, wholesaling, storage, transport, milling, retail, imports and exports is left entirely to the private sector. In this model, the state has a limited role to provide public goods (e.g. roads; market places), property rights, and light-touch regulations (e.g. quality standards). The second model allows for rule-based state operations of a more substantive kind. Specifically, the state would make clear in advance of each crop season precisely the quantity of stock it intended to procure or import (for food security or market operations purposes), the purchase price, the ceiling price to consumers, and its intent to use the private sector to import or export in defence of the acceptable domestic price range. The third model is the discretionary state intervention model that the authors consider is the dominant model in many eastern and southern African countries, and describes the type of maize market management that has prevailed in Malawi over the past two decades.

For these authors, the preferred future policy discussion is about shifting from the third model to the second model; not from the third to the first model. In this it seems that they probably concur with the critique of the neo-liberal stance expressed by the coordination school (Dorward and Kydd, 2004; Kydd and Dorward, 2004; Dorward *et al.*, 2005a; 2005b). However, moving from the third to the second model is a significant challenge in view of the historical adherence to the third model in countries like Malawi and Zambia. The GTPA experience in Malawi (Chapter 6) shows that merely setting up a forum in which private operators and government decision makers exchange views is nowhere near sufficient on its own. Indeed, there is a risk, also illustrated by the Malawi GTPA experience, that such a forum comes to be used by individual politicians to secure grain trading contracts on their own behalf. It is perhaps the neo-patrimonial dimension of the politics of the maize market that represents the most formidable barrier to making progress in this direction.

Several authors have argued that, objectively, circumstances should be quite propitious for an individual government to move closer to the rule-based way forward in policy decision making. For example, in the 2000s maize production across countries in the southern African region has shown little covariance in year to year trends, in contrast to the 1990s when covariance in production trends was quite marked (Tschirley and Jayne, 2010). The implication is that elimination of maize trade barriers between southern African countries and free cross-country private trading in maize, would, in many cases on its own prevent the extreme imbalances between domestic supply and demand that occur every few years in Malawi. The extent of informal cross-border trade into Malawi is now well substantiated, and banning private trade has no other effect than to prevent or steeply curtail the beneficial impacts on maize supply of this trade. Then there are technology changes such as the spread of mobile phones and internet that have made price information in different locations considerably more uniformly available and instantaneous than in the past. Finally, there is the scope discussed in Chapter 2 and also pursued in Tschirley and Jayne (2010) to use market-based risk management instruments such as call options to help governments take precautionary forward positions to protect future maize supplies in the event of production shortfalls.

This thesis stops short of making recommendations for policy change. There is no shortage of advisory admonitions regarding the way forward for improved management of the maize market in Malawi in the literature. The need for an eventual transition to a more predictable rule-based exercise of government market management is recognised in almost all policy writing on this topic. The intractable problem is not the destination, but the means of getting there.

7.4 Concluding Summary

This thesis has examined in considerable detail price instability in the maize market in Malawi. Price instability in staple food markets historically and contemporarily (in poor countries) is a critical policy problem because for extremely poor and vulnerable people their ability to afford food when their own supplies run out is literally a matter of life and death. After examining the literature on food price instability, and the history of market regulation in Malawi, the thesis sought first to reach a detailed understanding of the various dimensions of maize market instability in Malawi. This provides some useful ‘benchmarks’ for the policy discussion: average price seasonality is 60 per cent and has not been diminishing in the recent era; other food crops display signs of diminishing seasonality; and there is quite a lot of locational variation in the magnitude of seasonality in different maize markets around the country. An examination of market competition and efficiency suggests that imperfections in private maize markets are not the reason for the average degree of price seasonality in maize, nor for the recurrence of extreme price spikes in the maize market. A narrative examination of extreme price spikes reveals the role of politics and private-public coordination failures in generating them. Finally, the private-public coordination problem takes central position in the policy interpretation of these findings. This thesis would concur with the prognosis of other researchers that unless and until the government adopts a rule- rather than discretion-based approach to maize market management, episodes of excessive instability in the maize market are unfortunately likely to recur in the future.

Bibliography

Ahmed, R.U., 1988, 'Rice price stabilization and food security in Bangladesh', *World Development*, 16(9), pp.1035-1050.

Arlindo, P. and D. Tschirley, 2003, 'Regional trade in Maize in Southern Africa: examining the experience of Northern Mozambique and Malawi', *Policy Synthesis for Cooperating USAID Offices and Country Missions,* Ann Arbor: Michigan State University, (67) of FS II Policy Synthesis, available at: http://www.aec.msu.edu/fs2/polsyn/number67.pdf [accessed 6 October 2009].

Banse, M., Nowicki, P. and H.V. Meijl, 2008, *Why are current world food prices so high?* Landbouw Economisch Instituut (LEI) or Agricultural Economics Institute of Wageningen University and Research (UR) Centre, available at: http://library.wur.nl/way/bestanden/clc/1880664.pdf [accessed 4 March 2010].

Bates, R. H., 1981a, 'Food policy in Africa: political causes and social effects', *Food Policy,* 6(3), pp.147-157.

Bates, R.H., 1981b, *Markets and states in tropical Africa*, Berkeley: University of California Press.

Bates, R.H., A. Greif, M. Levi, J-L. Rosenthal and B. R. Weingast, 1998, *Analytic Narratives*, Chichester: Princeton University Press.

Bates, R.H., A. Greif, M. Levi, J-L. Rosenthal and B. R. Weingast, 2000, 'Review: The analytical narrative project', *The American Political Science Review*, 94(3), pp.696-702.

Baumol, W. J. and A.S. Blinder, 2003, *Microeconomics: principles and policy,* 9th edn, Ohio: Thomson South-Western.

Binswanger, H., 1980, 'Attitudes toward risk: experimental measurement in rural India', *American Journal of Agricultural Economics,* 62(3), 395-407.

Bond, M.E., 1985, 'Agricultural responses to prices in sub-Saharan African Countries', *IMF Staff Paper World Economics Outlook*, (30).

Booth, D., D. Cammack, J Harrigan, E Kanyongolo, M Mataure, and N Ngwira, 2006, *Drivers of change and development in Malawi*, London: Overseas Development Institute, available at: http://www.odi.org.uk/resources/download/1318.pdf [accessed 8 March 2010].

Brennan, M.J., 1958, 'The supply of storage', *American Economic Review*, 48(1), pp.50-72.

Browne, K., 2005, 'Snowball sampling: using social networks to research non-heterosexual women', *International Journal of Social Research Methodology,* 8(1**),** pp.47-60.

Byerlee, D., T.S. Jayne and R. J. Myers, 2006, 'Managing food price risks and instability in a liberalizing market environment: overview and policy options', *Food Policy* 31(4)**,** pp.275–287.

Chapoto, A., and T.S. Jayne, 2009, 'The impacts of trade barriers and market interventions on maize price predictability: evidence from Eastern and Southern Africa', *MSU International Development Working Paper*, (102), East Lansing: Michigan State University, December.

Chilowa, W., 1998, 'The impact of agricultural liberalisation on food security in Malawi', *Food Policy*, 23(6), pp.553-69.

Chinsinga, B., 2008, *Exploring the politics of land reforms in Malawi: a case study of the community based rural land development programme (CBRLDP)*, research programme consortium for improving institutions for pro-poor growth, Manchester: University of Manchester, available at: http://www.ippg.org.uk/papers/dp20.pdf [accessed 24 February 2010].

Chirwa, E.W., 2006, ‘Commercialisation of food crops in rural Malawi: insights from the household survey’, *Working Paper*, (2006/04), Zomba: Department of Economics, Chancellor College, University of Malawi.

Chirwa, E., 2009, *The 2007-2008 food price swing: impact and policies in Malawi*, policies for good economic management of food price swings in Africa, available at: http://www.okapi.it/estt/papers/Price%20Swings_Malawi.pdf, [accessed 18 October 2009].

Chirwa, E.W., P.M. Mvula and J. Kadzandira, 2005, ‘Agricultural marketing liberalisation and the plight of the poor in Malawi’, *Working Paper*, (2005/08), Zomba: Department of Economics, Chancellor College, University of Malawi.

Christiansen, R.E. and L.A. Stackhouse, 1989, ‘The privatization of agricultural trading in Malawi’, *World Development*, 17(5), pp.729-740.

Cliffe, L., 2006, *Politics and the feasibility of initiatives on hunger and vulnerability*, Regional Hunger and Vulnerability Program, available at: http://www.wahenga.net/uploads/documents/reports/Politics_HV_Aug2006.pdf [accessed 8 March 2010].

Cohen, L. and M. Holliday, 1982, ‘*Statistics for social scientists, an introductory text with computer programs in basic’,* London: Harper and Row Publishers, Inc.

Commander, S., (ed), 1989, ‘*Structural adjustment and agriculture: theory and practice in Africa and Latin America*,’ London: ODI.

Conforti, P., E. Ferrari and A. Sarris, 2009, ‘Impacts and policy responses to a commodity price boom: the case of Malawi’, *FAO Commodity and Trade Policy Research Working Paper*, (27), Rome: FAO, April.

Cooksey, B., 2003, ‘Marketing reform? the rise and fall of agricultural liberalisation in Tanzania’, *Development Policy Review*, 21(1), pp.67-91.

Corbett, J., 1988, 'Famine and household coping strategies', *World Development,* 16(9) pp.1099-1112.

Cornia, G.A. and G.K. Helleiner (eds), *From adjustment to development in Africa: conflict, controversy, convergence, consensus?*, London: Macmillan, 1994.

Coulter, J. and G. Onumah, 2002, 'The role of warehouse receipt systems in enhanced commodity marketing and rural livelihoods in Africa', *Food Policy,* 27(4), pp.319-337.

Cromwell, E. and A Chintedza, 2005, 'Neopatrimonialism and policy processes: lessons from the Southern African food crisis', IDS Bulletin, 36(2), pp.103-108.

Cross, S. and M. Kutengule, 2001, 'Decentralisation and rural livelihoods in Malawi', *LADDER Working Paper*, (4), Norwich: Overseas Development Group (ODG), University of East Anglia].

Cross, S., 2005, 'Comparative land tenure issues arising in four countries', Ch.12 in F. Ellis and H.A. Freeman (eds), *Rural livelihoods and poverty reduction policies*, London Routledge, pp.183-97.

Cummings, R., S. Rashid and A. Gulati, 2006, 'Grain price stabilization experiences in Asia: what have we learned?' *Food Policy*, 31(4), pp.302-312.

Dana, J., C.L. Gilbert and E. Shim, 2006, 'Hedging grain price risk in the SADC: case studies of Malawi and Zambia', *Food Policy*, 31(4), pp.357-371.

de Janvry, A., M. Fafchamps and E. Sadoulet, 1991, 'Peasant household behaviour with missing markets: some paradoxes explained', *Economic Journal*, 101(409), pp.1400-1417.

Dercon, S., 2002, *The Impact of economic reforms on rural households in Ethiopia: a study from 1989 to 1995,* Washington DC: The International Bank for Reconstruction and Development, the World Bank.

Dercon, S., (ed.) 2005, *Insurance against poverty: a study prepared by the World Institute for development economics research of the United Nations University (UNU-WIDER),* New York: Oxford University Press Inc.

Devereux, S., 1997, 'Household food security in Malawi', *Institute of Development Studies (IDS) Discussion Paper*, (362), Brighton: IDS.

Devereux, S., 1999, 'Making less last longer: informal safety nets in Malawi', *IDS Discussion Paper,* Brighton: IDS.

Devereux, S., 2002, State of disaster: causes, consequences and policy lessons from Malawi, Lilongwe: Action Aid.

Dorward A, J. Kydd and C. Poulton (eds), 1998, *Smallholder cash crop production under market liberalisation: a new institutional economics perspective*, Wallingford: CAB International.

Dorward, A. and J. Kydd, 2004, 'The Malawi 2002, food crisis: the rural development challenge', *Journal of Modern African Studies,* 42(3) PP.343–361.

Dorward A., S. Fan, J. Kydd, H. Lofgren, J. Morrison, C. Poulton, N. Rao, L. Smith, H. Tchale, S. Thorat, I. Urey and P. Wobst, 2004a, 'Institutions and policies for pro-poor agricultural growth', *Development Policy Review*, 22 (6), pp.611-622.

Dorward, A., J. Kydd, J. Morrison, and I. Urey, 2004b, 'A Policy agenda for pro-poor agricultural growth', *World Development*, 32(1), pp.73-89.

Dorward, A., J. Kydd, J. Morrison, and C. Poulton, 2005a, 'Institutions, markets and economic co-ordination: linking development policy to theory and praxis', *Development and Change,* 36(1), pp.1–25.

Dorward, A., J. Kydd and C. Poulton, 2005b, 'Beyond liberalisation: "developmental coordination" policies for African smallholder agriculture', *IDS Bulletin*, 36(2), pp.80-85.

Dorward, A., E. Chirwa, V. Kelly, T. Jayne, R. Slater, and D. Boughton, 2008, *Evaluation of the 2006/07 agricultural input subsidy programme Malawi, final report*, Lilongwe: Ministry of Agriculture and Food Security (MOAFS).

Dorward, A., and E. Chirwa, 2009, *The agricultural input subsidy programme 2005 to 2008: achievements and challenges*, School of Oriental and African Studies, London January, unpublished document.

Dorward, A., J. Kydd, C. Poulton, and D. Bezemer, 2009a, 'Coordination risks and cost impacts on economic development in poor rural areas', *Journal of Development Studies,* 45(7), pp.1093–1112.

Dorward, A., J.F. Kirsten, S. Were Omamo, C. Poulton and N. Vink, 2009b,'Institutions and the agricultural development challenge in Africa', Ch.1 in J.F. Kirsten, A.R. Dorward, C. Poulton and N. Vink, (eds), *Institutional economics perspectives on African agricultural development*, Washington D.C.: International Food Policy Research Institute (IFPRI), pp.3-34.

Ellis, F., 1983,'Agricultural marketing and peasant-state transfers in Tanzania', *Journal of Peasant Studies*, 10(4), pp.214-242.

Ellis, F., 1988, 'Tanzania', Ch.3 in C. Harvey (ed.), *Agricultural pricing policy in Africa*, London: Macmillan, pp.66-103.

Ellis, F., 1990, 'The rice market and its management in Indonesia', *IDS Bulletin*, 21(3), pp.44-51.

Ellis, F., 1992, *Agricultural policies in developing countries*, Cambridge: Cambridge University Press.

Ellis, F., 1993, *Peasant economics: farm households and agrarian development*, Cambridge: Cambridge University Press, 2nd edn.

Ellis, F. and T. Woldehanna, 2005, *Ethiopia participatory poverty assessment 2004-05,* Addis Ababa: Ministry of Finance and Economic Development, available at:

http://siteresources.worldbank.org/INTETHIOPIA/Resources/ppa_ethiopia.pdf [accessed 9 March 2010].

Ellis, F., 2007, 'Public works programmes, Malawi', *REBA Case Study Brief (11):* regional hunger and vulnerability programme (RHVP), November, available at: http: www.wahenga.net/index.php/evidence/case_study_briefs/[accessed 6 March 2010].

Ellis, F., 2009, 'Fertilizer subsidies and social cash transfers', Frontiers of Social Protection Brief, No.1, Johannesburg: Regional Hunger and Vulnerability Programme, September, available at: http://www.wahenga.net/sites/default/files/briefs/FOSP_Brief_1.pdf.

Ellis, F., S. Devereux and P. White, 2009, *Social protection in Africa*, Cheltenham: Edward Elgar.

Ellis, F., 2010, '"We are all poor here": economic difference, social divisiveness, and targeting cash transfers in sub-Saharan Africa', *Journal of Development Studies*, forthcoming.

Ellis, F. and F. Marchetta, 2010, 'Poverty targeting: new evidence on spatial and distributional aspects', *Frontiers of Social Protection Brief*, (2), Johannesburg: Regional Hunger and Vulnerability Programme, available at:http://www.wahenga.net/sites/default/files/briefs/FOSP_Brief_2.pdf (accessed 3 April 2010).

Engberg-Pedersen, P., P. Gibbon and P. Raikes, 1996, *Limits of adjustment in Africa*, Oxford: James Currey.

Fafchamps, M. and E. Gabre-Madhin, 2006, *Agricultural markets in Benin and Malawi*, Global Poverty Research Group (UK), Oxford, Washington: Economic and Social Research Council (ESRC) Global Poverty Research Group (UK).

FAO, 2001, *Food balance sheet: a handbook*, available at: http://www.fao.org/docrep/003/x9892e/x9892e00.htm [accessed 10 March 2010].

FAO, 2009, *FAOSTAT*, available at: http://faostat.fao.org/ [accessed 29 November, 2009].

FEWSNET, 2001a, *Malawi monthly food security report mid-April - mid-May 2001*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx, [accessed 25 January 2010].

FEWSNET, 2001b, *Malawi monthly food security report mid-November – mid-December, 2001*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 25 February 2010].

FEWSNET, 2002, *Malawi monthly food security report mid- January – Mid-February 2002*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 25 January 2010].

FEWSNET, 2003, *Malawi monthly food security report Mid-May 2003 – end of June, 2003*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 25 February 2010].

FEWSNET, 2005a, *Malawi food security update February 2005*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 22 January 2010].

FEWSNET, 2005b, *Malawi food security update September 2005*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 22 January 2010].

FEWSNET, 2007a, *Malawi food security update May 2007*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 24 January 2010].

FEWSNET, 2007b, *Malawi food security update August 2007*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 24 January 2010].

FEWSNET, 2008a, *Malawi food security update August 2008*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 24 January 2010].

FEWSNET, 2008b, *Malawi food security update September 2008*, Famine Early Warning Systems Network, Washington, Lilongwe, available at: http://www.fews.net/Pages/default.aspx [accessed 24 January 2010].

FEWSNET, 2009, *Informal cross border food trade in Southern Africa*, Famine Early Warning Systems Network, Washington, available at: http://www.fews.net/Pages/default.aspx [accessed 25 January 2010].

FEWSNET, 2010, *Informal cross border food trade in Southern Africa, January 2010*, Famine Early Warning Systems Network, Washington, available at: http://www.fews.net/Pages/default.aspx [accessed 19 March 2010].

Gibbon, P., 1992, 'A failed agenda? African agriculture under structural adjustment with special reference to Kenya and Ghana', *Journal of Peasant Studies*, 20(1), pp.50-96.

Gibbon, P., 1996, 'Structural adjustment and structural change in Sub-Saharan Africa: some provisional conclusions', *Development and Change*, 27(4), pp.751-84.

Goetz, S. and M.T. Weber, 1986, *Fundamentals of price analysis in developing countries food systems: a training manual to accompany the microcomputer software program "MSTAT", Working Paper* (29),Washington: Michigan State University.

Grandin, B.E., 1988, *Wealth ranking in smallholder communities: a field manual*, London: Intermediate Technology.

Gray, J., 1992, 'Maize pricing policy in Eastern and Southern Africa', *Food Policy*, December, 17(6), pp.409-419.

Grosh, M., C. del Ninno, E. Tesliuc and A. Ouerghi, 2008, *For protection and promotion: the design and implementation of effective safety nets*, Washington DC, World Bank.

GTPA, 2006, *Constitution of the grain traders and processors association*, Lilongwe: GTPA.

Haggblade, S., H. Nielson, J. Govereh, and P. Dorosh, 2008, *Potential consequences of intra-regional trade in short-term food security crises in Southeastern Africa'*, Michigan State University, available at: http://www.aec.msu.edu/fs2/trade/report_2_consequences_of_trade-final.pdf [accessed 31 January 2010].

Harlow, A.A., 1960, 'The hog cycle and the cobweb theorem', *Journal of Farm Economics,* November, 42(4), pp. 842-853.

Harrigan, J., 1988, 'Malawi: The impact of pricing policy on smallholder agriculture 1971-1988', *Development Policy Review*, 6(4), pp.415-433.

Harrigan, J., 2001, *From dictatorship to democracy,* Hampshire: Ashgate Publishing Company.

Harrigan, J., 2003, 'U-turns and full circles: two decades of agricultural reform in Malawi 1981–2000', *World Development*, 31(5), pp.847-863.

Harrigan, J., 2008, 'Food insecurity, poverty and the Malawian starter pack: fresh start or false start?', *Food Policy* 33(3), pp.237–249.

Harvey, C., 1988, (ed), *Agricultural pricing policy in Africa*, London: Macmillan.

Hayenga, Marvin L., 1978, 'Pricing problems in the food industry (with emphasis on thin markets)', a compendium of papers presented at the symposium on pricing problems in the food industry (with emphasis on thin Markets) Washington, D.C., March 2-3, 1978 *In:* Hayenga, M. L. (ed.) *Symposium on pricing problems in the food* *industry (with emphasis on thin markets).* Washington D.C: Research Division, College of Agricultural and Life Sciences, University of Wisconsin-Madison.

Hazell P.B.R., C. Pomareda , A. Valdés , J. S. Hazell, (eds), 1986, *Crop insurance for agricultural development: issues and experience*, Baltimore , London: published for IFPRI, by Johns Hopkins.

Heisey, P. W. and M. Smale, 1995, 'Maize technology in Malawi: a green revolution in the making*?', CIMMYT Research Report (4),* Mexico D.F: CIMMYT.

IDEAA Malawi, 2005, *Improving agriculture market price data project document*, Lilongwe: Initiative for Development and Equity in African Agriculture (IDEAA).

IMF, 2002, *Malawi-the food crisis, the strategic grain reserve, and the IMF*, Malawi Factsheet July 2002, available at http://www.imf.org/external/np/exr/facts/malawi.htm [accessed 7 April, 2010].

IMF, 2008, *Malawi: sixth and final review under the three-year arrangement under the poverty reduction and growth facility*, Country Report (08/265), July, available at http://www.imf.org/external/country/MWI/index.htm [accessed 7 April, 2010].

IMF, 2009*, Malawi: request for a one-year exogenous shocks facility arrangement*, Country Report (09/16), January, available at http://www.imf.org/external/country/MWI/index.htm [accessed 7 April, 2010].

Jackson, R.H. and C.G. Rosberg, 1984, 'Personal rule: theory and practice in Africa', *Comparative Politics*, 16(4), pp. 421-442.

Jayne, T. S. and S. Jones, 1997, 'Food marketing and pricing policy in Eastern and Southern Africa: a survey', *World Development,* 25(9), pp.1505-27.

Jayne, T. S., J. Govereh, A. Mwanaumo, J.K. Nyoro, and A. Chapoto, 2002, 'False promise or false premise? the experience of food and input market reform in Eastern and Southern Africa', *World Development,* 30 (11) pp.1967-1985.

Jayne, T. S., T. Yamano, M.T Weber, D. Tschirley, R. Benfica, A. Chapoto, and B. Zulu, 2003, ‘Smallholder income and land distribution in Africa: implications for poverty reduction strategies’, *Food Policy,* 28(3), pp.253–275.

Jayne, T. S., B. Zulu, and J. J. Nijhoff, 2006, ‘Stabilizing food markets in Eastern and Southern Africa’, *Food Policy* 31(4), pp.328-341.

Jayne, T. S., J. Mangisoni, and N. Sitko, 2008a, *Social analysis of Malawi's maize marketing reforms*, Lilongwe: World Bank, available at: http://www.aec.msu.edu/fs2/zambia/tour/Malawi_maize_market_FINAL_WB_Report_A4.pdf [accessed 25 February 2010].

Jayne, T. S., A. Chapoto, I. Minde, and C. Donovan, 2008b, *The 2008/09 food price and food security situation in Eastern and Southern Africa: implications for immediate and longer run responses*, International Development Working Paper –Draft, East Lansing: Michigan State University, available at: http://www.aec.msu.edu/fs2/papers/idwp97.pdf [accessed 25 January 2010].

Jayne, T.S. A. Chapoto, and B. Shiferaw, 2009, ‘Improving the performance of staple markets to exploit the productive potential of smallholder agriculture’, Paper Presented at the *Conference on agricultural markets*, CGIAR System and Alliance for a Green Revolution in Africa (AGRA), May 13-15, Nairobi, Kenya.

Jayne, T. S. and D. Tschirley, 2009, ‘Food price spikes and strategic interactions between the public and private sectors: market failures or governance failures?’, Paper presented at the meeting: *institutions and policies to manage global market risks and price spikes in basic food commodities*, 26-27 October 2009, Trade and Markets Division, FAO: Rome.

Johansen, S., 1995*, Likelihood-based inference in cointegrated vector autoregressive models*, Oxford: Oxford University Press.

Jones, W.O., 1972, *Marketing staple food crops in tropical Africa*, New York: Cornell University Press.

Kahlon, A.S. and D.S. Tyagi, 1983, *Agricultural price policy in India*, New Delhi: Allied Publishers.

Kanbur, R., (ed), 2001, *Qualitative and quantitative poverty appraisal: complementarities, tensions and the way forward*, Working Paper (2001-05), Department of Applied Economics and Management, Cornell University, May.

Kherallah, M., C. Delgado, E. Gabre-Madhin, N. Minot and M. Johnson, 2000, 'The road half travelled: agricultural market reform in sub-Saharan Africa', *Food Policy Report* (10), Washington D.C.: Food Policy Research Institute (IFPRI).

Krueger, A.O., 1992, '*The political economy of agricultural pricing policy: Volume 5, A synthesis of the economics in developing countries: a World Bank comparative study'*, Baltimore and London: Johns Hopkins.

Kutka, A.H., 2009, *The market-enhancing role of agricultural commodity exchanges and their food security function in sub-Saharan Africa: assessing the Ethiopian commodity exchange*, a dissertation submitted for B. A. development studies degree, University of East Anglia.

Kydd, J., and R. Christiansen, 1982, 'Structural change in Malawi since independence: consequences of a development strategy based on large-scale agriculture', *World Development,* 10(5)**,** pp.355-375.

Kydd, J.G., A. Dorward and C. Poulton, 2002, 'New institutional economics, agricultural parastatals and marketing policy', Ch.9 in D. Belshaw and I. Livingstone (eds.), *Renewing development in sub-Saharan Africa: policy, performance and prospects,* London: Routledge, pp. 166-175.

Kydd, J. and A. Dorward, 2004, 'Implications of market and coordination failures for rural development in least developed countries', *Journal of International Development*, 16(7), pp.951–970.

Kydd, J.G., 2009, 'A new institutional economic analysis of the state and agriculture in sub-Saharan Africa', Ch.20 in J.F. Kirsten, A.R. Dorward, C. Poulton and N. Vink, (eds), *Institutional economics perspectives on African agricultural development*, Washington D.C.: IFPRI, pp.429-60.

Lall, S. V., H. Wang, and T. Munthali, 2009, *Explaining high transport costs within Malawi: bad roads or lack of trucking competition*?, Policy research working paper, Lilongwe and Washington: the World Bank sustainable development network economics and urban development department, available at: http://econ.worldbank.org [accessed 5 December 2009].

Levi, M., 2004, 'An analytic narrative approach to puzzles and problems', Ch.10 in I. Shapiro, R. M. Smith and T. E. Masoud, *Problems and methods in the study of politics*, New York: Cambridge University Press, pp.201-226.

Lipton, M., 1968, 'The theory of the optimising peasant', *Journal of Development Studies*, 4(3), pp.327-51.

Long, G., M. K. Hogg, S. Bettany, and P. Eccles, 1999, *Transforming relationship marketing via subversive readings: paper for critical management studies,* Critical marketing stream, University of Lancaster, available at: http://www.mngt.waikato.ac.nz/ejrot/cmsconference/1999/documents.asp, [accessed 8 March 2010].

Maddala, G. S. and I.-M Kim, 1998, *Unit roots cointegration and structural change* Cambridge: Cambridge University Press.

Magrath, P., 1999, 'The post-harvest system in Indonesia', Ch.4 in B. Harriss-White (ed), *Agricultural markets from theory to practice*, London: Macmillan, pp.96-114.

Government of Malawi, 2002, *Malawi national land policy*, Lilongwe: Ministry of Lands, Physical Planning and Surveys.

Government of Malawi, 2003, *Price information data collection methodology*, Lilongwe: Agro-Economic Survey Unit of Agricultural Planning Services, MOAFS.

Government of Malawi, 2005a, *Integrated household survey 2004*-2005: socio economic characterstics, Zomba: National Statistical Office.

Government of Malawi, 2005b, *Study/action on impact indicators and monitoring and evaluation system for food and nutrition security policy in Malawi*, Lilongwe: MOAFS.

Government of Malawi and World Bank, 2006, *Malawi poverty and vulnerability assessment: investing in our future*, Lilongwe: Ministry of Economic Planning and Development and World Bank, available at: http://www.aec.msu.edu/fs2/mgt/caadp/ [accessed 24 February 2010].

Government of Malawi, 2007a, *2007/08 annual agricultural statistical bulletin*, Lilongwe: MOAFS.

Government of Malawi, 2007b, *Field crops production estimation methodology manual*, Lilongwe: MOAFS.

Government of Malawi 2008a, *Monitoring and evaluation system for food security and nutrition policies of Malawi,* 6th Monitoring and Evaluation report of the food security and nutrition policies working group Lilongwe: MOAFS.

Government of Malawi, 2008b, *Population and housing census final report 2008*,Zomba: National Statistical Office.

Government of Malawi, 2008c, *Malawi welfare monitoring survey*, Zomba: National Statistical Office.

Government of Malawi, 2009a, *Press release purchase and selling of maize*, Lilongwe: *MOAFS.*

Government of Malawi, 2009b, *Crop production data,* (Excel data sheets), Lilongwe: MoAFS, Agro-Economic Survey Unit.

Government of Malawi and IFPRI, 2001, *The determinants of poverty in Malawi 1998: an analysis of the malawi integrated household survey, 1997-98*. Lilongwe, Zomba and

Washington: The National Statistical Office, the National Economic Council, and IFPRI.

Massell, B.F., 1969, 'Price stabilization and welfare', *Quarterly Journal of Economics*, 83(2), pp.84-298.

McCann, J.C., 2005, *Maize and grace: Africa's encounter with a new world crop, 1500–2000,* Cambridge: Harvard University Press.

McCord, A., 2008, 'The social protection function of short-term public works programmes in the context of chronic poverty', Ch.8 in Barrientos, A. and D. Hulme (eds), *Social protection for the poor and poorest: concepts, policies and politics*, London: Palgrave Macmillan pp.160-180.

Mellor, J.W. and R. Ahmed (eds), 1988, *Agricultural price policy for developing countries*, Baltimore: Johns Hopkins.

Menon, R., 2007, *Famine in Malawi: Causes and Consequences*, Human Development Report, office occasional paper, UNDP, Available at: http://www.sarpn.org.za/documents/d0002907/Famine_Malawi_HDR_UNDP_2007.pdf [accessed 22 January 2010].

Miracle, M. P., 1965, 'The introduction and spread of maize in africa', *The Journal of African History*, 6(1)**,** pp.39-55.

Mukhebi, A., and J. Kundu, 2003, *An Agricultural marketing and information system for Malawi*, a project report, Lilongwe: IDEAA Malawi and the International Crops Research Institute for the Semi-Arid Tropics.

Myers R.J., 2006, 'On the costs of food price fluctuations in low income countries', *Food Policy*, 31(4), pp.288-301.

Myers, R. J., 2008, *Evaluating the efficiency of inter-regional trade and storage in Malawi maize markets*, Lilongwe and Washington: World Bank.

Newbery, D.M.G. and J.E. Stiglitz, 1981, '*The theory of commodity price stabilisation'*, Oxford: Oxford University Press.

NFRA, 2008, *Accounting records (statistics for storage of strategic grain reserves)* {handout}, Lilongwe: National Food Reserve Agency.

North, D.C., 1990, *Institutions, institutional change and economic performance*, Cambridge University Press.

Nyirongo, C. C., H.C.Y. Gondwe, F.B.M. Msiska, H.A.J. Mdyetseni, and F.M.C.E. Kamanga, 2001, *TIP 2000-2001 targeted inputs programme: a quantitative study of markets and livelihood security in rural Malawi, module 2, part 1*, Lilongwe: MOAFS.

Oi, W.Y., 1961, 'The desirability of price instability under perfect competition', *Econometrica* 29(1), pp.58-64.

Onumah G.E., J. R. Davis, U. Kleih and F.J. Proctor, 2007, *Empowering smallholder farmers in markets: changing agricultural marketing systems and innovative responses by producer organizations*, European Consortium for Agricultural Research in the Tropics; European Economic Interest Grouping, available at: http://www.esfim.org/download/ESFIM_Working_Paper_2.pdf, [accessed 9 December 2009].

Øygard, R., R. Garcia, A. G. Guttormsen, R Kachule, A. Mwanaumo, I. Mwanawina, E. Sjaastad and M. Wik, 2003, 'The *Maze of maize: improving input and output market access for poor smallholders in Southern African region, the experience of Zambia and Malawi',* Norway: Agricultural University of Norway, Department of Economics and Resource Management available at: http://www.odi.org.uk/projects/03-food-security-forum/docs/the_maze_of_maize1.pdf [accessed 25 February 2010].

Paris, S., 1991a, *Land resources appraisal of Blantyre agricultural development division, field document*, Lilongwe: Land Husbandry Branch, Malawi Government MOAFS, United Nations Development Programme, FAO, Lilongwe.

Paris, S., 1991b, *Land resources appraisal of Kasungu agricultural development division, field document*, Lilongwe: Land Husbandry Branch, Malawi Government MOAFS, United Nations Development Programme, FAO, Lilongwe.

Paris, S., 1991c, *Land resources appraisal of Mzuzu agricultural development division, field document No.27*, Lilongwe: Land Husbandry Branch, Malawi Government MOAFS, United Nations Development Programme FAO, Lilongwe.

Poulton, C. J. Kydd and A. Dorward, 2006a, 'Overcoming market constraints on pro-poor agricultural growth in sub-Saharan Africa', *Development Policy Review*, 24(3), pp. 243-277.

Poulton, C., J. Kydd, S. Wiggins and A. Dorward, 2006b, 'State intervention for food price stabilisation in Africa: can it work?', *Food Policy*, 31(4), pp.342-356.

Pryor, F., 1990, *The political economy of poverty, equity and growth: Malawi and Madagascar*, World Bank Comparative Study Series, Oxford: Oxford University Press.

Rapsomanikis, G., 2009, *The 2007-2008 food price swing: impact and policies in Eastern and Southern Africa*, Trade and Markets Division, Rome: FAO, July, available at: http://www.okapi.it/estt/papers/Price%20swings_Southern-Africa.pdf [accessed 19 October 2009].

Rebourg, C., M. Chastanet, B. Gouesnard, C. Welcker, P. Dubreuil, and A. Charcosset, 2003, 'Maize introduction into Europe: the history reviewed in the light of molecular data', *TAG Theoretical and Applied Genetics,* 106 (5), pp.895-903.

Revenga, A., 2008, *Rising food prices: policy options and World Bank response*, recent market developments, Washington, available at: http://siteresources.worldbank.org/NEWS/Resources/risingfoodprices_backgroundnote_apr08.pdf [accessed 25 February 2010].

Sahn, D. E., and C. Delgado, (eds.) 1989, *The nature and implications for market interventions of seasonal food price variability,* Baltimore and London: Johns Hopkins for the IFPRI.

Sandbrook, R., 1986, 'The state and economic stagnation in tropical Africa', *World Development*, 14(3), pp.319-332.

Schmitz, A., 1984, *Commodity price stabilization: the theory and its application*, Staff Working Paper (668), Washington D.C.: World Bank.

Sen, A., 1980, *Levels of poverty: policy and change: a background study for World Development Report*, Staff Working Paper (401), Washington D.C.: World Bank.

Sen, A., 1981, *Poverty and famines: an essay on entitlement and deprivation,* New York: Oxford University Press Inc.

Shepherd, A. W., 1997, *Market information services: theory and practice*, FAO Agricultural Services Bulletin, (125), Rome. Available at: http://ftp.fao.org/docrep/fao/003/x6993e/x6993e01.pdf, [accessed 9 December 2009].

Siamwalla, A., 1988, 'Public stock management', Ch.5 in Mellor, J.W. and R. Ahmed (eds), *Agricultural price policy for developing countries*, Baltimore: Johns Hopkins, pp.81-93.

Sjaastad, E., R. Kaarhus, P. Vedeld, and B.K. Wold, 2007, *Privatisation and liberalisation in the agricultural sector: an examination of processes and outcomes in three African cases*, Noragric Report (39), Department of International Environment and Development Studies, Norwegian University of Life Sciences (Noragric), available at: http://www.umb.no/statisk/noragric/publications/reports/noragricreport39.pdf, [accessed 8 April 2010].

Skoufias, E., B. Davis, and J. R. Behrman, (1999), An evaluation of the selection of beneficiary households in the education, health and nutrition program (PROGRESA) of Mexico, final report, Washington, D.C.:IFPRI.

Slater R. and Dana J, 2006, 'Tackling vulnerability to hunger in Malawi through market-based options contracts: implications for humanitarian agencies', *Humanitarian Exchange,* (33), pp.13-17, March, available at:

http://www.reliefweb.int/rw/lib.nsf/db900sid/AMMF-6R9CMZ/ [accessed10 December 2009].

Smale, M., 1993, *Maize is life: maize research and smallholder production in Malawi*, *case study for the maize research impact in Africa study*, Washington: Africa Bureau, ARTS/FARA, USAID.

Smale, M., 1995, '"Maize is life": Malawi's delayed green revolution', *World Development,* 23(5), pp.819-831.

Smale, M. and P. W. Heisey, 1997, 'Grain quality and crop breeding when farmers consume their grain: evidence from Malawi', International Association of Agricultural Economists Occasional paper (7) in*:* Rose, R., C. Tanner and M. A. Bellamy, (eds.) *Issues in agricultural competitiveness: markets and policies,* Aldershot (United Kingdom): Dartmouth Publishing Co.Ltd, pp.185-197.

Smale, M. and T. S. Jayne, 2009, 'Breeding an "amazing" crop: improved maize in Kenya, Malawi, Zambia, and Zimbabwe', Ch. 4 in D.J Spielman, and R. Pandya-Lorch, (eds.) *Million Fed: Proven Successes in Agricultural Development,* Washington:IFPRI, pp.33-40.

Smith, L.D., 1995, 'Malawi: reforming the state's role in agricultural marketing,' *Food Policy*, 20(6), pp.561-571.

StataCorp LP, 2009, *Stata time series reference manual release 11,* College Station, Texas: StataCorp LP.

Stevens, C., S. Devereux and J. Kennan, 2002, *The Malawi famine of 2002: more questions than answers*, IDS Discussion Paper, July, available at http://www.odi.org.uk/events/famine_july2002/devereux.pdf [accessed 8 April 2010].

Takavarasha, T., 2006, 'The Role of the private sector in addressing food emergencies and vulnerabilities in Southern Africa: a summary of the literature,' paper prepared for *FAO/University of Pretoria Workshop on partnerships between governments and private sector to overcome food shortages*, Pretoria 23-24, March, 2006 Rome: FAO, available at: http://www.fao.org/ag/AGS/subjects/en/agmarket/esa/takavarasha.pdf [accessed 19 January 2010].

Tavares, H., 1998, 'Poststructural feminisms and alter-pedagogical tales', *Review of Education, Pedagogy, and Cultural Studies,* 20(1), pp.77- 98.

Tembo, G., A. Chapoto, T. Jayne, and M. Weber, 2009, 'Food security research project: fostering agricultural market development in Zambia', *Working Paper No. 40 Food Security Research Project Lusaka, Zambia,* available at: Http://Www.Aec.Msu.Edu/Agecon/Fs2/Zambia/Index.Htm *)* [accessed 9 December 2009].

The Daily Times, 15 September 2008, Press release, clarification on the buying and selling of food maize by MOAFS, Lilongwe: *The Daily Times*, p.10.

Timmer, C.P., 1980, 'Food prices and food policy analysis in LDC's', *Food Policy*, 5(3), pp.188-199.

Timmer, C. P., W.P Falcon, and S.R. Pearson, 1983, *Food policy analysis,* Baltimore: Johns Hopkins.

Timmer, C.P., 1986a, 'The role of price policy in rice production in Indonesia 1968-1982', in R.A. Goldberg (ed), *Research in domestic and international agribusiness management*, Greenwich, Conn: JAI Press, pp.55-106.

Timmer, C.P., 1986b, '*Getting prices right: the scope and limits of agricultural price policy'*, Ithaca and New York: Cornell University Press.

Timmer, C.P., 1989, 'Food price policy: the rationale for government intervention', *Food Policy*, 14(1), pp.17-27.

Tollens, E., 2005, '*A review of the impact of Rockefeller Foundation funded activities conducted by the Kenya agricultural commodity exchange and the Malawi agricultural commodity exchange*', Centre for agricultural and food economics, Leuven: Belgium.

Tomek, W.G. and K.L. Robinson, 1981, *Agricultural product prices*, 2nd edn. Ithaca and London: Cornell University Press.

Trostle, R., 2008, *Global agricultural supply and demand: factors contributing to the recent increase in food commodity prices*, *A* report from the economic research service, United States Department of Agriculture, World Agricultural Outlook Board available at: http://www.graansa.co.za/documents/8%20Aug%20WRS0801.pdf [accessed 4 March 2010].

Trotter, B. W., 1992, *Applying price analysis to marketing systems: methods and examples from the Indonesian rice market,* Kent: Natural Resources Institute.

Tschirley, D. and T.S Jayne, 2008, *Food crises and food markets: implications for emergency response in Southern Africa*, Michigan State University, Available at: http://www.aec.msu.edu/fs2/polsyn/number82.pdf [accessed 15 March 2010].

Tschirley, D., and T.S. Jayne, 2010, 'Exploring the logic of Southern Africa's food crises', *World Development,* Vol.38, No.1, forthcoming.

UNCTAD, 2005, *Progress in the development of African commodity exchanges,* Geneva: Available at website: http://r0.unctad.org/infocomm/comm_docs/docs/official/enAUMinismee.pdf (accessed 15 April 2009).

van de Walle, N., 2001, *African economies and the politics of permanent crisis*, Cambridge: Cambridge University Press.

Walker, T.S., and N.S. Jodha, 1986, 'How small farm households adapt to risk', Ch.2 in P. Hazell, C. Pomareda, A. Valdes and J. S. Hazell, (eds.), *Crop insurance for agricultural development*, Baltimore: Johns Hopkins, pp.17-34.

Walsh, A., 1990, *Statistics for the social sciences,* New York: Harper and Row Publishers Inc.

Waugh, F. V., 1944, 'Does the consumer benefit from price instability?', *Quarterly Journal of Economics*,58(4), pp.602-614.

World Food Program (WFP), 2008, *Food procurement*, Lilongwe available at http://one.wfp.org/country_brief/indexcountry.asp?country=454# [accessed 26 March 2010].

Whetham, E., 1972, *Agricultural marketing in Africa*, London: Oxford University Press, 1972.

White, H., 2002, 'Combining quantitative and qualitative approaches in poverty analysis', *World Development*, 30(3), pp.511-522.

Whiteside, M., M. Maro, D. Saiti, and M.-J. Schouten, 2003, *Enhancing the role of informal maize imports in Malawi food security: a consultancy report for DFID*, Lilongwe: DFID. available at: http://www.malawiagriculture.org [accessed 26 February 2010].

Williamson, O. E., 1985, *The economic institutions of capitalism*, New York: The Free Press.

Wodon, Q., and H. Zaman, 2008, *Rising food prices in sub-Saharan Africa: poverty impact and policy responses*, The World Bank Human Development Network and Poverty Reduction and Economic Management Network.

World Bank, 1981, *Accelerated development in sub-Saharan Africa,* Washington DC: World Bank, ('Berg Report').

World Bank, 2005, *Managing food price risks and instability in an environment of market liberalization*, Washington D.C.: World Bank, Agriculture and Rural Development Department.

World Bank, 2006, '*Managing food price risks and instability in an environment of market liberalization*', Washington D.C.: the International Bank for Reconstruction and Development.

World Bank, 2007, *World development report 2008: agriculture for development*, Washington DC: World Bank.

Appendix I: Farmer and Trader/Processor Questionnaires

I. Farmer Questionnaires Maize Form

Consent form to participate in the survey on maize marketing in Malawi.

The maize farmer survey questionnaire is designed to discover a range of information concerning maize production inputs, this season's harvest of maize, maize sold at harvest, marketing costs, later sales of maize, farmers' sales behaviour, own maize consumption, storage of maize, maize milling for home consumption, and marketing problems and means to overcoming them. It is also designed to identify the kinds of markets and buyers who purchase maize from farmers. Both men and women farmers will be interviewed.

It is your choice if you want to take part or not. If you do choose not to take part there will be no negative consequences for you to participate in maize marketing because of this decision. The information you give during the research will be kept confidentially and will be used for research purpose only. All information you share is private and confidential which means that no body will know about what you share. Your individual responses will not be made public, so no one will ever know what you have said during the interviews. In case after signing the consent form you decide to withdraw the consent to participate you are free to do so and can stop the interview any time you wish.

To accept to participate in the study: Sign and date this form where indicated below.

To decline to take part in the study: Sign and date this form where indicated below.

(A) Consent to take part in the study

by signing and dating this form below, I,………………………… accept to take part in the study.

Signature: ……………………………………..Date**:** ……………………………………

(B) Decline to take part in the study

by signing and dating this form below, I, ……………………………….., decline to take part in the study.

Signature:………………………………………Date: ……………………….................

FARMER IDENTIFICATION

Name of Respondent……………………………………Sample No……………………...

Gender Male |____| 1; Female = |____| 2

Contact details: (Address and Telephone number)………….……………………………..

………………………………………………………………………………………..

………………………………………………………………………………………..

Village of Respondent…………………………………………………………………..

Section…………………………………………………………………………………..

EPA……………………………………………………………………………………..

District Name …………………………………………………………………………..

Date of Survey………………………………………………………………………….

BASIC HOUSEHOLD DATA

Household Code:

Village

Members of HH currently resident

Enter code and short description, as underlined

Id	Name	Age (yrs)	Sex	Relationship to H/H head	Education Level Reached	Marital Status	Main Occupation
	coding		1 = M 2 = F	1 = Head 2 = Wife/husband 3 = Child 4 = Other relation 5 = Other permanent	1 = None 2 = Std IV 3 = Std VII 4 = Form IV 5 = Form VI 6 = Higher	1 = Single 2 = Married 3 = Divorced 4 = Widowed 5 = Widower 6 = Separated	1 = Child 2 = School 3 = House/farm 4 = Farmer 5 = Fisherman 6 = Govt./Parastatal employee 7 = Private sector employee 8 = Self-employed (non-farm)
			CODE	CODE	CODE	CODE	CODE
1							
2							
3							
4							
5							
6							
7							
8							
9							

If more than 9 HH residents, continue on a second form B

Total resident HH members:

Maize Production Inputs

1. What is the total land owned by the household? …..………………………..Acres

2. How much land did you cultivate maize this season?...................................Acres

3. Inputs used in maize production

	Type of Input	**Quantity Used (incl. units)**	**How did you obtain this input? (ENTER CODE & DESCRIPTION)**		**Price Paid for Each Input (incl. unit of purchase)**
			code	description	
1	OPV maize seed				
2	Hybrid maize seed				
3	Fertilizer Base Dressing				
4	Fertilizer Top Dressing				
5	Agro-chemicals				
6	Hired labour or *ganyu*				

CODES: 1=purchased at full price; 2=purchased at coupon price; 3=provided free; 4=paid wage; 5=paid in-kind; 6=kept from last harvest.

4. When did you harvest your maize? ……………………………………………………….

This Season's Harvest (This Season – 2007-08)

5. Total maize harvest and how it is divided:

Category	**Quantity**	**Unit of Measurement**
Total Maize Production		
Amount Sold at Harvest		
Amount Kept to Sell Later		
Amount Kept for Home Consumption		

NOTE: Maize sold and kept is expected to add up to total maize production figures.

6. How much maize do you have in store now? ....(quantity and units).

(CHECK – this should equal the sum of the two amounts kept in the table; if not, then further questioning about the harvest and how it is divided were necessary)

Subsequent questions follow-up on these different components of the total harvest: harvest sales, later sales, own maize consumption.

Maize Sold At Harvest

7. Where and to whom did you sell this maize?

a) At the farm (or in the village),

i. To a trader (name and location of trader)

…………………………………………………………………………………….
………..…………………………..………………………………………………
…………………………………………………………………….……………

ii. To a miller (name and location of miller)

……………………………………………………………………………………
………………………………..…..…………………………………………………
…………………..……………………………………………………………

iii To other (specify name and location of buyer at the farm)

……………………………………………………………………………………...
………………..……………...…………………………………………………...
…………………….…………..……………………………..……………...…

b) At a market (place of market, distance from farm or village)

……………………………………………………………………………………..
………………..……………...……………………………………………………..
…………………….…………..……………………………..……………...…

c) Other options

…………………………………………………………………………………….
………………..…………………………………………………………………
…………………………..………………………………………………………

8. In the case of travel to market or town:

a) How far is the market or town (km)? …………………………………………...

b) What form of transport was used

i. pick-up,

ii. bus,

iii. ox-cart,

iv. donkey

v. Other specify …………………………………………………………….....

c) How much was carried for one trip (quantity/unit of measurement)?...................

....

d) How many trips were made?..

e) What was the cost per trip (if someone else was paid for the transport)?.............

9. Price of Maize sales:

(a) What was the price you obtained, for maize sold soon after harvest? …………..

(b) Quantity sold at this price. ……………………………………unit of measurement (on the cob, or as maize grain). *(CHECK – is this the same as the quantity stated in the table above for maize sold at harvest; if not the same, what else is happening e.g. multiple sales to many different buyers?)* ……………...

…………………………………………………………………………….....

…………………………………………………………………………….....

(c) Total cash income obtained from this maize sale or each maize sale?................. …………………………………………………………………………….MK

10. Reasons for sale immediately after harvest (*circle the answer that gives the best description of the farmer's reason for selling maize after harvest): (circle the correct answer*)

(a) I had extra maize that I did not need for family consumption

(b) I needed cash in order to pay off debts (e.g. to a trader or moneylender)

(c) I needed cash in order to pay school fees

(d) I needed cash in order to buy consumer goods (e.g. clothes, shoes etc.)

(e) None of the above – I sold maize after harvest for the following main reason:………………………...

Later Sales of Maize

11. Do you plan to sell some of your maize stocks later in the year? YES/NO *(circle the correct answer*)

12. If YES,

(a) How much (what quantity) of the amount that you have stored do you intend to sell later? (quantity and measurement unit) ……………………………………...

(b) Do you expect prices to be higher later in the year (YES/NO) (circle the correct answer)

(c) What is the price of maize now MK……………………/kg grain, what do you expect the price to be in November MK……………………............/kg grain.

If YES, will this still leave you with sufficient maize to last your family for the year? YES/NO (circle the correct answer)

13. If NO to this last question, how many months family consumption will you keep in store? ……………………………………………………………………………….

Farmer Sales Behaviour

14. Do you usually sell to the same buyer? YES/NO (circle the correct answer)

15. If YES, circle the answer which best describes the reason why this is so?

(a) This is the only buyer who comes to this village to buy maize.

(b) This buyer is a relative or friend and I trust him/her to give me a good price.

(c) This buyer is not a relative/friend, but always gives me the best price so I prefer to sell to him/her.

(d) I am in debt to this buyer, and that is why I sell to him/her

(e) Other reason, specify……………………………………………………......................

16. If NO, circle the answer which best describes the reason why this so?

(a) I sell to the buyer who gives me the best price, and the person can be different each time.

(b) I check the price in the market first, and then sell to the person who offers the best market price.

(c) Different buyers come to this village at different times, so it is normal to sell to different buyers.

(d) Other reason, specify …………………………………………………........................

....

Own Maize Consumption

17. Just to check again, you are keeping …..………………………………………maize *(quantity, units of measurement) for family consumption during this year?*

Conversion rates:

18. Maize on the cob to maize grain (for example, if someone has 20 bags of maize on the cob, how many bags/kg of grain is this?...

19. Maize grain to maize flour (if this farmer takes maize grain to the mill to make flour, how much flour does he or she expect to get – 50 kg grain give how many kg flour?). ……………………………………………………………………………….kgs

20. With the farmer, calculate and verify the expected total flour equivalent to the maize that is stored for home consumption: so the maize that you have in store should give you …………………………………………………………(kg of flour in total)

21. To feed the family, on average how much maize flour do you need:

(a) per day………………………and for how many people?......................................

(b) per week……………...and for how many people?..

22. Therefore you are keeping enough maize to last the family for……………………....
………………………. ………………………………months from the last harvest?

CHECK - verify this calculation with the farmer e.g. if 7 kg maize is required per week, and 140 kg flour equivalent is stored, then own supply should last 20 weeks (= 5 months)

Storage of Maize

Description of maize storage methods

23. Storage facilities/equipment (circle the correct answer)

a) Brick roofed improved maize granaries

b) Small Metal silos

c) Traditional Nkhokwe

d) Bags stored in the home

e) Other Specify ……………………………………………………………………......

24. Maize treatment during storage (circle the correct answer)

(a) None

(b) Actellic dust

(c) Liquid Actellic

(d) Fumigation

(e) Other specify…………………………………………………………………………

25. Do you normally lose some of your maize in store? YES/NO (circle the correct answer)

26. And if YES to above for what main reason (circle the correct answer)

a) Rot due to moisture,

b) Insect infestation

c) Rodent infestation

d) Other specify ……………………………………………………………………....

27. Approximately how much of the maize that you have in store do you expect to lose for these reasons: quantity or rough proportion……………………………….........

28. How do these losses affect the length of time you can feed your family? (Go through the previous calculation allowing for losses). Adjusted months coverage of maize in store after accounting for stock losses……………………………………..months.

Milling Maize Kept for Home Consumption

29. What is the cost per kg of input or output that is charged for milling?.........................

30. Is payment by cash or in kind i.e. sometimes a proportion of the output is kept by the miller? (circle the correct answer)

(i) Cash

(ii) In kind

(a) How often do you take maize for milling? ……………………………………..

(b) What quantity is typically milled each time you go for milling? …………….............

Key Food Marketing Problems and Means to Overcoming Them

31.Please, rank the following problems and costs of trading, in order of important (highest cost) to the least important (lowest cost). *Rate one the most important or highest cost*

a. Finding out selling prices (market search) =|____|

b. Finding out buyers (market search) =|____|

c. Transport from the farm to the point of sale (transport) =|____|

d. Storage costs (storage) =|____|

e. Loss of crop in storage (losses in storage) =|____|

f. Lack of credit (credit) =|____|

g. Use of inaccurate weighing scales by buyers (weighing) =|____|

h. Theft (theft) =|____|

32 What policy changes are required towards markets? Please rank the following policy options in order of the most important to the least important. *Rate 1 the most important.*

(i) Market linkage =|____|

(ii) Transport brokerage =|____|

(iii) Grading and packaging services =|____|

(iv) Warehouse/storage service =|____|

(v) Weighing services =|____|

(vi) Credit linkage services =|____|

(vii) Building entrepreneurial, business management, contract supply obligations including supermarket marketing, and leadership capacity of farmers and traders =|____|

(viii) Improving the rural feeder roads infrastructure and general security =|____|

(ix) Promotion and introduction of Information Communication Technologies (ICT) within easy reach distance for fast communication of information including agriculture marketing information =|____|

(x) Other Specify………………………………………………………………...

Thank you very much!!!

II Trader/Buyer/Processor Questionnaire Maize Form

Consent Form to Participate

The trader/buyer and miller/processor form is designed to obtain data concerning the different kinds of traders/buyers and millers/processors who purchase maize from farmers, size of their operations, financing of purchases, use of purchased maize, storage of purchased maize, key food marketing problems and means to overcoming them.

This questionnaire applies to all types of persons who buy from farmers including millers and processors who buy direct from farmers and including farmers who buy off from other farmers. In cases where there is more than one intermediary between farmer and miller/processor, then the second or further intermediary will be interviewed using the parts of this questionnaire that are relevant in the particular case.

It is your choice if you want to take part or not. If you do choose not to take part there will be no negative consequences for you to participate in maize marketing because of this decision. The information you give during the research will be kept confidentially and will be used for research purpose only. All information you share is private and confidential which means that no body will know about what you share. Your individual responses will not be made public, so no one will ever know what you have said during the interviews. In case after signing the consent form you decide to withdraw the consent to participate you are free to do so and can stop the interview any time you wish.

To accept to participate in the study: Sign and date this form where indicated below.

To decline to take part in the study: Sign and date this form where indicated below.

(A) Consent to take part in the study

by signing and dating this form below, I, ……………………………………..., accept to take part in the study

Signature: ……………………………………Date: ……………………………………

(B) Decline to take part in the study

by signing and dating this form below, I………………………………………decline to take part in the study.

Signature: …………………………………Date: ....

Trader/Buyer Profiles

Trader/Buyer Identification

1. Location ……………………………2.Sample No..

3. Name of Buyer/Trader/Miller/Processor……………………………………………..

4. Gender Male = |____| 1; Female = |____| 2 (Tick the correct answer)

5. Contact details: (Address and Telephone number)……………………………………...

6. District Name………………………………………………………………………....

7. Date of Survey………………………………………………………………………..

Type of Buyer/Trader or Miller/Processor and Size of Operation

8 Type of Buyer/Trader or Miller/Processor *(Circle the description that most closely corresponds to this trader).*

Local maize trader – trades maize only in his district/area

Long-distance maize trader – trades across districts

Other: Specify………………………………………………………………………...

9. Are you a full time or part time buyer or trader? *(Tick the correct answer)*

Full time = |____|1; Part time = |____|2

10. If part time then what is your main other occupation? *(Tick the correct answer)*

Farmer = |____| 1, Farm labourer = |____| 2, Non-farm wage earner = |____| 3, Non-farm self-employed = |____| 4 Civil Servant = |____| 5, Multiple occupation = |____| 6

11. Do you buy and sell on your own account = |____| 1, or as an agent for another trader = |____| 2 *(Tick the correct answer)*

12. If you are an agent for another trader, then what is the name and contact details of the trader for whom you buy:

Name:……………………………………………………………………………....

Contact details:………………………………………………………………………..

……………………………………………………………………………………...

13. How do you transport the maize that you buy from farmers?

Bicycle = |____| 1

Donkey = |____| 2

Ox-cart = |____| 3

Pick-up truck = |____| 4

Other (specify) = |____| 5. ……………………………………………………………..

14. <u>Size of operation – number of farmers</u> (the current or immediately past harvest season)

In a typical day, from how many farmers do you buy maize ……………… (No. of farmers)

How many days in the week do you buy maize ………………………. (Days of the week)

[During the harvest season]

In a typical week, from how many farmers do you buy maize ……………..… (No. of farmers)

(CHECK that these figures make sense i.e. daily, weekly, no of day's operation) Add additional notes here if necessary:……………………………………………….

…………………………………………………..

……………………………………………………………………………………...

15. <u>Size of operation – quantity of purchases</u> (the current or immediately past harvest season)

Typical (or average) quantity of maize purchased per day…………………… (unit)

Typical (or average quantity of maize purchased per week…………………...(unit)

(CHECK that these figures make sense i.e. daily, weekly, no of day's operation) Add additional notes here if necessary:……………………………………………….

…………………………………………………..

……………………………………………………………………………………...

16. How much maize have you bought in total so far this harvest season?.........................

……………………………………………………………………………..(units)?

17. How much maize do you expect to buy this season?.......................................(units?

Purchases from Farmers

(Questions here refer to the most recent transactions and prices undertaken by this trader, even those of the same day or yesterday)

18. Details of the most recent purchase of maize

19. When was your last purchase of maize from a farmer?...

20. How much maize did you buy (and in what form?): ……………………...50 kg bags

Form (physical)…………………..…………………………………………..50 kg bags

21. What price did you pay for that maize……………………………….(CHECK units)

22. What was the cost of transport……………………………………...…MK per unit

23. What is the name and location of the farmer?

Name:……………………………………………………………………………...

Place……………………………………………………………………….……

(Note: the price can be checked with the farmer, if the location is nearby)

Verification of Price (Farmer)

24. Can you verify that you sold maize to trader………………………………..YES/NO

25. What was your price of sale to that trader……………….……..........(……..………..units)

Finance of Purchases (Buyer/Trader)

Payment of farmers:

26. Do you pay farmers in cash? YES/NO)

27. If NO, please could you explain in what form, or stages, farmers get paid for their sales……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

Finance of purchases

28. Do you obtain a cash advance or loan in order to make crop purchases? YES/NO

29. If YES, from who (circle the correct answer)

(a) from a moneylender

(b) From a credit institution (name of credit institution…………………………)

(c) From a bank (name of bank……………………………………………………..)

(d) from a relative or friend

(e) from another bigger trader or miller, for whom he is acting as agent

(f) Other, specify………………………………………………………………………..

Rate of interest on loan (Specify rate of interest and period applicable e.g. 10% over 3 months) ……………………………………………………………………………..

Sales of Last Maize Purchased

30. What did you do with the last maize you bought? …………………………………....

(e.g., stored, transported, sold)

31. If you sold the maize, where and to whom did you sell it? Provide contact details if available.

Place of Sale: ……………………………………………………………………....

Details of Purchaser: ………………………………………………………………

..……………………………………………………………………………………

a. Quantity of Maize sold: …………………………………………………………

b. Price at which the maize was sold: ……………………………………………...

c. Cost of transport to market:………………………………………….……….....

32. Type of road to market *(Circle the correct answer)*

a. Footpath

b. Earth

c. Tarmac

d. other specify

33. How long did it take to sell? …………………………………………...(Hours, days)

34. Why did you choose to sell in this market, or to this buyer? Circle the answer which best describes the reason why this is so?

a. There is only one trader who comes to this village to buy maize.

b. This buyer is a relative or friend and I trust him/her to give me a good price.

c. This buyer is not a relative/friend, but always gives me the best price so I prefer to sell to him/her.

d. I am in debt to this buyer, and that is why I sell to him/her

e. Other reason, specify ……………………………………………………………

35. More generally, what are the price factors that determine where and to whom you sell your maize?

(Circle the answer which best describes the reason why this is so?)

a. I sell to the buyer who gives me the best price, and the person can be different each time.

b. I check the price in the market first, and then sell to the person who offers the market price.

c. Other reason, specify …………………………………………………………...

Storage of Maize

Describe the storage method for maize storage?

36. Storage facilities/equipment *(circle the correct answer)*

a. Brick roofed improved maize granaries

b. Small Metal silos

c. Traditional Nkhokwe

d. Bags stored in the home

e. Other Specify …………………………………………………….................

37. Maize treatment during storage *(circle the correct answer)*

a. None

b. Actellic dust

c. Liquid Actellic

d. Fumigation

e. Other specify…………………………………………………………………………..

38. How much maize do you have in store at this moment? ……………………………...

39. Do you normally lose some of your maize in store? Yes/No *(circle the correct answer)*

40. And if yes to above for what reason *(circle the correct answer)*

a. Rot due to moisture,

b. Insect infestation

c. Rodent infestation

d. Other specify …………………………………………………………………

41. Approximately how much of the maize that you have in store do you expect to lose due to these reasons: quantity or rough proportion…………………………………....

42. What was the purchase price of maize at the time of going into store?

43. What is the expected duration in store?

44. What is the expected minimum sale price at the end of the storage period to break-even? (i.e. selling price at time of expected sale out of store)

45. What is the current market rate of interest on borrowed money? (Per cent over specified time period).

Key Food Marketing Problems and Means to Overcoming them

46. Please rank the following problems and costs of trading, in order of the most important (highest cost) to the least important (lowest cost). *(Rate 1 the most important or with highest cost)*

a. finding out selling prices (market search) =|____|

b. finding out buyers and (market search) =|____|

c. transporting from the farm to the point of sale (transport) =|____|

d. storage costs (storage) =|____|

e. loss of crop in storage (losses in storage) =|____|

f. poor quality of crop purchased from the farmer (low quality) =|____|

g. lack of credit (credit) =|____|

h. use of inaccurate weighing scales by buyers (weighing) =|____|

i. theft (theft) =|____|

Institutional Issues

47. How is trading treated by officials, local government, and police?

48. Do you need a license in order to trade? YES/No

49. If YES:

From where do you obtain your license……………………………………………

How much does the license cost…………………………………………………

How often must you renew your license……………………………………….....

Do you have to pay more than the official fee for the license ?……….YES/NO

If YES, typically how much does the license cost you…………………………..

50. Aside from licenses, do you incur other costs for trading? ………………....YES/NO

51. If YES:

Taxes paid at point of purchase in villages…………………………...…YES/NO

If YES, state typical taxes that must be paid……………………………………...

………………………………………………………………………………………

Taxes paid at point of sale in markets…………………………………...YES/NO

If YES, state typical taxes that must be paid……………………………………...

…………………………………………………………………………………………

Are you ever stopped at police roadblocks…………………………...YES/NO

If YES, how much do you usually have to pay to pass through the roadblock ……………………………………………………………………………………….

52. Is it easy to go into trading i.e. are there any restrictions formal or informal for one to go into trading?

If yes what are these restrictions *(circle what best describes your situation*

a. Not allowed to sell at the market by vendors already established at market

b. Lack of space in the market

c. Other specify ……………………………………………………………………. ……………………………………………………………………………………..... ……………………………………………………………………………………....

53. To what extent do you think officials are consistent and predictable towards traders? *(Circle the correct answer)*

a. Very consistent

b. Very predictable

c. Inconsistent

d. Unpredictable

54. Do you think MIS services provided through MACE and/or MOAFS are adequate to act on their own in overcoming problems of market efficiency? YES/NO

a. If Yes provide reasons *(Circle the answer which best describes your situation)*

(i) To know prices in different markets thereby providing an idea of the ruling market prices hence helps improve price bargaining power.

(ii) Buyer identification

(iii) Information on where o source commodities.

b. If No provide reasons *(Circle the answer which best describes your situation)*

(i) Poor roads

(ii) Lack of transport

(iii) Lack of credit

(iv) Lack and poor business management and entrepreneurial skills

(v) Poor storage facilities

(vi) Lack of fast and timely communication systems between producers and buyers.

(vii) Other specify……………………………………………………………………….

55. What policy changes are required towards maize markets? Please rank the following policy options in order of the most important to the least important. *(Rate 1 the most important).*

(vi) Market linkage =|____|

(vii) Transport brokerage =|____|

(viii) Grading and packaging services =|____|

(ix) Warehouse/storage service =|____|

(x) Weighing services =|____|

(vi) Credit linkage services =|____|

(vii) Building entrepreneurial, business management, contract supply obligations including supermarket marketing, and leadership capacity of farmers and traders =|____|

(viii) Improving the rural feeder roads infrastructure and general security =|____|

(ix) Promotion and introduction of Information Communication Technologies (ICT) within easy reach distance for fast communication of information including agriculture marketing information =|____|.

(xi) Other Specify………………………………………………………….=|____|

Thank you very much!

Appendix II: Malawi Nominal and Real Average Maize Prices

Appendix IIa: Malawi Nominal and Real Average Maize Prices 1989-2000

	1989-91			1991-94			1994-97			1997-2000		
	Year	**Nom.**	**Real**	**Year**	**Nom.**	**Real**	**Year**	**Nom.**	**Real**	**Year**	**Nom.**	**Real**
Jul				1991	0.33	4.46	1994	0.73	5.38	1997	2.53	6.09
Aug					0.36	4.88		0.80	5.71		2.79	7.15
Sep					0.36	4.86		0.90	5.95		3.31	8.44
Oct					0.35	4.65		0.96	5.72		4.04	10.25
Nov					0.40	5.30		1.10	5.95		4.45	10.75
Dec					0.43	5.67		1.23	6.07		4.86	11.15
Jan				1992	0.43	5.46	1995	1.36	6.21	1998	6.04	12.74
Feb					0.44	5.40		1.42	6.16		7.59	15.60
Mar					0.44	5.38		1.31	5.48		7.07	14.23
Apr					0.42	5.02		1.39	5.63		4.85	9.63
May					0.43	4.98		1.22	4.80		4.62	9.12
Jun					0.43	5.04		1.37	5.27		4.15	8.28
Jul	1989	0.27	4.39		0.58	6.39		1.51	5.62		4.95	9.96
Aug		0.29	4.72		0.51	5.44		1.63	5.97		5.66	11.53
Sep		0.31	5.04		0.50	5.16		1.69	5.83		7.01	12.50
Oct		0.31	5.06		0.66	6.65		1.82	5.84		8.20	14.02
Nov		0.36	5.87		0.81	7.93		2.21	6.59		9.29	14.74
Dec		0.36	5.87		1.06	10.28		2.80	7.90		10.43	15.64
Jan	1990	0.37	5.71	1993	0.88	8.34	1996	3.18	8.47	1999	11.78	15.97
Feb		0.36	5.56		0.92	8.54		3.49	9.11		11.50	15.14
Mar		0.39	6.02		0.78	7.18		3.25	8.43		10.79	13.86
Apr		0.35	5.23		0.63	5.83		2.87	7.34		9.50	12.30
May		0.31	4.63		0.56	5.21		2.21	5.61		6.31	8.06
Jun		0.31	4.63		0.52	4.89		1.92	4.89		6.40	8.38
Jul		0.33	4.81		0.52	4.93		2.61	6.68		7.36	9.86
Aug		0.38	5.53		0.50	4.60		2.06	5.78		6.60	9.42
Sep		0.39	5.68		0.59	5.20		2.19	6.22		6.98	9.12
Oct		0.39	5.54		0.61	5.23		2.24	6.36		7.31	9.45
Nov		0.42	5.97		0.66	5.48		2.35	6.42		7.61	9.11
Dec		0.45	6.40		0.72	5.90		2.61	6.90		8.53	9.97
Jan	1991	0.46	6.52	1994	0.70	5.51	1997	2.56	6.38	2000	8.27	8.61
Feb		0.48	6.75		0.79	5.96		2.78	6.78		8.46	8.53
Mar		0.47	6.58		0.82	5.99		3.10	7.49		8.84	8.81
Apr		0.40	5.53		0.82	5.94		2.69	6.42		8.02	8.20
May		0.34	4.70		0.84	6.07		2.51	5.96		5.73	5.94
Jun		0.31	4.25		0.70	5.15		2.47	5.91		5.25	5.62

Source: MoAFS

Note: Real prices are nominal prices deflated by the monthly CPI index, base-year = 2000

Appendix IIb: Malawi Nominal and Real Average Maize Prices 2000-2009

	2000-2003			2003-2006			2006-2009		
	Year	**Nom.**	**Real**	**Year**	**Nom.**	**Real**	**Year**	**Nom.**	**Real**
Jul	2000	5.49	5.87	2003	10.17	6.95	2006	18.76	8.35
Aug		5.15	5.67		10.44	7.09		19.30	8.36
Sep		5.36	5.39		10.83	6.95		20.39	8.62
Oct		5.51	5.28		12.62	7.41		21.32	8.58
Nov		6.32	5.61		14.05	8.25		22.19	8.67
Dec		6.45	5.57		13.83	7.88		22.24	8.74
Jan	2001	7.21	5.96	2004	15.97	9.13	2007	21.18	8.50
Feb		7.35	5.94		16.61	9.67		19.22	7.89
Mar		7.53	6.16		19.12	11.32		18.21	7.75
Apr		7.53	6.21		16.66	10.20		16.03	6.89
May		7.16	5.94		13.44	8.20		14.26	6.28
Jun		7.94	6.80		12.96	7.50		14.61	6.11
Jul		9.27	7.88		13.63	7.79		15.63	6.49
Aug		13.14	11.19		14.00	7.78		16.86	6.80
Sep		17.11	13.87		15.73	8.53		18.04	7.09
Oct		18.91	15.73		15.86	8.17		20.76	7.76
Nov		19.67	16.74		17.29	8.63		24.11	8.72
Dec		24.60	21.30		17.53	8.72		28.67	10.41
Jan	2002	31.00	22.17	2005	17.88	9.03	2008	34.18	12.68
Feb		32.48	22.57		17.61	9.03		39.69	15.09
Mar		28.96	20.21		17.36	9.17		43.53	17.08
Apr		18.62	13.23		15.93	8.46		35.41	14.00
May		15.16	10.89		16.39	8.67		32.83	13.25
Jun		14.10	10.45		18.00	9.00		37.94	14.50
Jul		15.16	11.26		18.68	9.22		48.72	18.47
Aug		16.15	11.95		20.55	9.83		55.52	20.43
Sep		16.29	11.42		23.15	10.78		53.38	19.08
Oct		16.74	11.76		29.11	12.85		54.33	18.45
Nov		18.42	12.67		32.77	13.97		57.81	19.07
Dec		19.94	13.51		34.34	14.65		63.47	21.04
Jan	2003	18.34	11.51	2006	41.68	18.20	2009	69.22	23.50
Feb		19.03	11.74		50.67	22.44		70.57	23.28
Mar		17.22	10.90		45.95	21.06		65.27	21.63
Apr		13.39	8.67		27.46	12.68		45.36	15.41
May		10.51	6.93		19.07	9.00		34.08	11.92
Jun		9.47	6.47		18.31	8.19		32.98	11.93

Source: MoAFS

Note: Real prices are nominal prices deflated by the monthly CPI index, base-year = 2000

Appendix III: List of Institutions Interviewed

ID	Name	Category	Own Buying or Agency	Location	Institution	District
1	Mrs. A. Lourengo	Processor	Agency	Blantyre	Chibuku Products Ltd	Blantyre
2	Mr. H. Jamaldeen	Processor	Agency	Blantyre	Rab Processors	Blantyre
3	E. Mdzinga	Long Distant Trader	Agency	Lilongwe	Mulli Brothers	Lilongwe
4	Jalo Van Tonder	Processor	Agency	Lilongwe	Central Poultry	Lilongwe
5	Paulo Chiziwa	Processor	Agency	Kanengo	GTPA	Lilongwe
6	Mahesh Ghedic	Processor	Agency	Lilongwe	Export Trading	Lilongwe
7	Stanley Kamtsitsi	District/National Buyer	Agency	Mzimba	ADMARC	Mzimba
8	N.D Saukira –	District/National Buyer	Agency	Lilongwe	NFRA	Lilongwe
9	N. Dzombe	Processor	Agency	Lilongwe	Blessings Campus	Lilongwe
10	W. Mitumbira	Local Trader	Own Buying	Mission	Mobile Trader	Mulanje
11	B. Kathumba	Local Trader	Own Buying	Mujiwa	Mobile Trader	Mulanje
12	Lucius Mapeto	Local Trader	Own Buying	Mtambalika	Mobile Trader	Mulanje
13	Keston Mbewe	Local Trader	Own Buying	Mujiwa	Mobile Trader	Mulanje
14	Spoon	Local Trader	Own Buying	Nanchidwa	Mobile Trader	Mulanje
15	Steven Nyson	Local Trader	Own Buying	Mtambalika	Mobile Trader	Mulanje
16	Lafayeli Leston	Local Trader	Agency	Chinteka	Mobile (Masina)	Mchinji
17	Kalemba Kalieni	Local Trader	Own Buying	Chinteka	Mobile Trader	Mchinji
18	Esnart Nachiola	Local Trader	Agency	Chinteka Kariba	ADMARC	Mchinji
19	H. D. Masina	Local Trader	Own Buying	Chinteka Walilanjii	Mobile (Masina)	Mchinji
20	Ms. I. Kumwenda	Local Trader	Own Buying	Jenda	Jenda MRC	Mzimba
21	Mphatso Mbewe	Long Distant Maize Trader	Agency	Chinteka	FarmersWorld	Mchinji
22	Yamikani Fabiano	Long Distant Maize Trader	Agency	Chinteka	Mulli Brothers	Mchinji
23	Peterson Kaponda	Long Distant Trader	Agency	Jenda	Mulli Brothers	Mzimba
24	William Nyirenda	Long Distant Trader	Agency	Jenda	Export Trading	Mzimba
25	Andrew Chapola	Long Distant Trader	Agency	Jenda	Farmers World	Mzimba
26	Elwin Banda	Long Distant Trader	Agency	Jenda	ADMARC	Mzimba
27	Harlord Khulupirire	Long Distant Trader	Agency	Jenda	Kulima Gold	Mzimba
28	Kenneth A. Nkankha	Service provider	Government	Lilongwe	Ministry of Trade	Lilongwe

Source: Field Survey May to August 2008