

Coping with Drought in Zimbabwe: Survey Evidence on Responses of Rural Households to Risk

BILL KINSEY

*Free University, Amsterdam, the Netherlands
University of Zimbabwe, Harare, Zimbabwe*

KEES BURGER and JAN WILLEM GUNNING*

Free University, Amsterdam, the Netherlands

and

Free University, Amsterdam, the Netherlands

Summary. — The major risk facing rural households in Zimbabwe is that of drought. We use panel data to investigate responses of one set of households to this risk. The panel represents households resettled during the first two years of Zimbabwe's post-independence land reform program. The data are for a period (1983–96) in which Zimbabwe experienced four major droughts (in 1982–84, 1986–87, 1991–92 and 1994–95). In three of the four droughts, state and nongovernmental organization (NGO) drought-relief schemes provided substantial support to help maintain consumption levels. In this context, households make little use of liquid assets (cash or jewelry) and only limited use of the financial system. The main private coping mechanism is the sale of cattle. Households most at risk during droughts are those without livestock. We show that this coping mechanism is consistent, contrary to what is sometimes suggested in the literature, with substantial accumulation of livestock wealth. © 1998 Elsevier Science Ltd. All rights reserved

Key words — Zimbabwe, drought, coping mechanisms, cattle, risk, resettlement

1. INTRODUCTION

Rural households in developing countries typically face enormous risks. Their incomes are highly uncertain as a result of the effect of weather variability, crop diseases and pest attacks on agricultural output and the volatility of prices for their crops. Income fluctuations may lead to consumption instability and this can be highly undesirable, especially when a household is very poor so that a consumption shortfall may imply starvation. Since credit and insurance markets often do not exist or function only very imperfectly, rural households have developed alternative mechanisms for dealing with risk. There exists an enormous literature on these mechanisms (e.g., Newbery and Stiglitz, 1981; Besley, 1995; and the symposium in the Summer 1995 issue of the *Journal of Economic Perspectives*). In the absence of credit and insurance markets, households can attempt to smooth income (by choosing less risky activities or by diversifying

their portfolio of activities), to take the volatility of income as given and smooth consumption, or—most commonly—employ some combination of these two.

*This work has been supported in Harare by the British Development Division in Central Africa, UNICEF and the former Ministry of Lands, Resettlement and Rural Development. Additional support was provided by grants in the United Kingdom from the Nuffield Foundation, the Overseas Development Institute, and the Department for International Development (formerly ODA). Assistance has also been received from the International Food Policy Research Institute, the Centre for the Study of African Economies at the University of Oxford, the Free University, Amsterdam, and the Research Board of the University of Zimbabwe. The data were collected and analyzed by Kinsey. Drafting was done by Gunning and Kinsey, and the draft was reviewed and modified by Burger. Modifications to reflect the referee's comments were made by Kinsey. The authors are grateful for helpful comments to an anonymous reviewer. Final revision accepted: July 17, 1997.

Given these options, the relatively poor tend to smooth income more than consumption while the relatively wealthy tend to smooth consumption alone. The use of household assets for consumption smoothing has attracted considerable attention (e.g. Deaton, 1990, 1997; Dercon, 1992; Paxson, 1992). When borrowing is difficult or impossible, households have an incentive to build up sufficient assets in good years to be used in bad years, either directly (if the asset consists of consumption goods, such as a stock of food) or indirectly (by selling the asset to finance consumption).

Consumption smoothing may be very costly in circumstances characterized by difficulty in borrowing and by the fact that rural households often have access to only very limited portfolios of assets. Financial assets may have negative real returns as a result of nonmarket interventions (such as interest ceilings) and may, in addition, involve substantial transaction costs. Food stocks are subject to deterioration and loss, and livestock face risks of theft, disease and loss from other causes. The result may be that household saving is largely for smoothing rather than for accumulation, as has been suggested by Deaton (1990).

In this paper we present empirical evidence on consumption smoothing in Zimbabwe. The case of Zimbabwe is interesting in three ways. First, risks are substantial: in particular, most rural households are regularly exposed to drought.¹ Second, Zimbabwe is one of the more developed countries in sub-Saharan Africa. Markets are likely to function relatively well, making efficient responses to the risk of drought possible. Finally, panel data exist for a group of some 400 rural households which has been studied by one of us (Kinsey) for over a decade. The data cover 1983–96, which includes the most serious drought in living memory (1991–92). Data have been collected both on the actual responses of households to drought and on intended responses to hypothetical future occurrences.

The paper describes the responses of the panel households to the risk of drought. The use of financial assets and sales of household effects or personal assets such as jewelry (an important mechanism in parts of Asia²) turn out to be relatively unimportant. The most important private coping mechanism used by the panel households is the sale of livestock; the use of income from temporary local employment is also important, but this mechanism relies on public works programs as well as private channels. In spite of the use of livestock for consumption smoothing, considerable accumulation of livestock wealth has occurred. The evidence examined leads us to conclude that the accumulation of cattle by panel households provides them with greater flexibility in coping with drought than many households in Zimbabwe experience.

The structure of the paper is as follows. In Section 2 we describe the panel and the data set. Section 3 presents empirical evidence on responses to past droughts. In Section 4, we consider the mechanisms currently used to deal with drought. Section 5 sets out our conclusions.

2. THE PANEL DATA

Since independence in 1980, more than 70,000 families have been resettled under Zimbabwe's land reform program. The program acquires large-scale farms and changes their layout to accommodate smallholder or cooperative farming. The largest component of the program resettles individual families into tightly clustered villages³ and allocates each family a 0.4 hectare residential plot, a uniform five hectares of arable land and the right to use a variable amount of grazing land on a communal basis.

The criteria originally employed to choose participants for resettlement emphasized the selection of the poor, the landless, the economically disadvantaged and those particularly adversely affected by the liberation war. To eliminate favoritism, families were often assigned farming land and residential plots by way of a random draw, resulting in planned villages which often comprised collections of strangers and which were always more densely settled and less widely dispersed than villages in Zimbabwe would normally be. Other comparisons with smallholder families in nonresettlement areas of Zimbabwe reveal that resettled families typically have much more arable land, grazing land which is under less pressure of livestock numbers and less access to facilities, such as markets, which operate most efficiently with high population densities. Resettled areas however tend to have better access to services such as seasonal credit, agricultural extension and veterinary assistants.

Another important difference is the extent to which resettled families are subject to a wide range of rules and regulations that define what they can and cannot do. For example, a common way of coping with economic stress in rural Zimbabwe—migrating to urban areas for temporary employment—was prohibited to the heads of resettled households for more than a decade. The resettlement agency insisted firmly that households devote themselves exclusively to agriculture. Only repeated drought and the growing default rate on seasonal agricultural loans persuaded officials to relax conditionally the prohibition on nonfarm employment in the early 1990s.⁴ Regulations were also promulgated with the intent to ensure the sustainability of production in resettlement schemes. These included, among others, limits

on livestock numbers and prohibitions on environmentally destructive practices.⁵

The resettlement program was implemented very rapidly during the early 1980s but has slowed dramatically since that time. The reasons why the pace of the program has changed are complex and beyond the scope of this paper; among them however are a barrage of criticisms and negative evaluations—from both within and outside government—that the program has failed to have a positive impact on agricultural productivity and rural incomes.⁶

Over 1982–84, a panel was constructed from among resettled households. The sampling frame was all resettlement schemes established in the first two years of the program—1980–82—in Zimbabwe's three agriculturally most important agroclimatic zones (known as *Natural Regions*—NRs). Households in the panel reside in NRII, NRIII and NRIV, respectively areas of moderately high, moderate and low or restricted agricultural potential. One scheme was selected randomly from each agroclimatic zone: Mupfurudzi in NRII, Sengezi in NRIII and Mutanda in NRIV (See Figure 1). Random sampling was then used to select villages within schemes, and in each selected village an attempt was made to cover all resident households. The resulting panel, which has been surveyed

annually since 1983, consists of some 400 families residing in 20 villages.⁷ Because the panel was established early in the resettlement program, the households generally reflect the selection criteria discussed above.⁸ This statement does not imply however that there is little heterogeneity among resettled households. There are notable differences among settlers which depend on the specifics of their personal backgrounds and initial or present circumstances. Most apparent, for example, are differences between those who formerly worked on white-owned commercial farms and those who came from communal areas: the former are almost invariably badly educated and asset-poor and are commonly aliens, while the latter are better-educated, have experience in agricultural decision-making, and can draw on social networks. Comparable differences exist between small, female-headed households and large, male-or-female-headed households. There are also striking differences among schemes in the histories of households. Mutanda, for example, was settled initially almost entirely by squatters who administered themselves before government agencies stepped in to assume this role. Many families in Mupfurudzi had been confined to so-called protected villages during the liberation war and developed a remarkable social and political cohesion, although

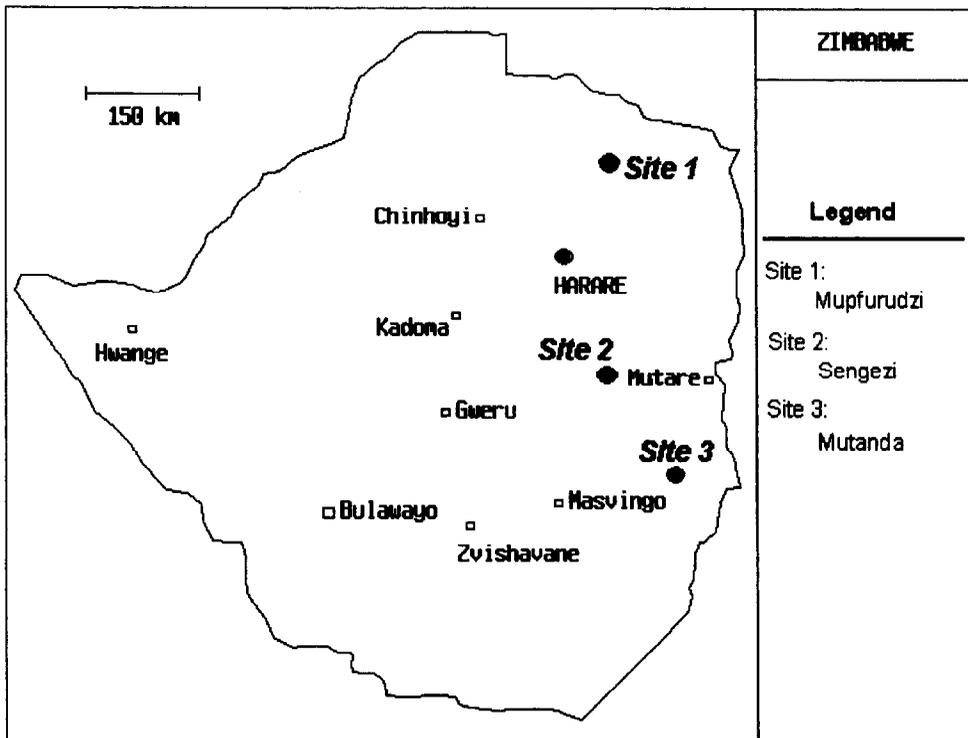


Figure 1. Zimbabwe: Location of the three resettlement schemes.

they had often been traumatized and impoverished by the war. Sengezi is noteworthy for containing large numbers of families who were said to have been evicted from surrounding communal areas by neighbors, who considered them to be anti-social, or because they belonged to the wrong political party. In the absence of relevant survey work from the early 1980s, we cannot judge how representative the panel is of poor and disadvantaged rural families; we are therefore limited to noting that all the groups intended to benefit from the resettlement program are well-represented in the panel.

The exact content of each round of the surveys varies according to the issues which have been emphasized at the time. Each round however has collected a similar core of data, mainly at the same time of year, which has been supplemented in certain years by detailed attention to a "theme issue." Annual surveys, conducted from 1983 to 1997, have collected a standardized set of information comprising data on: land use; crop production, yields and sales; agricultural practices and inputs; agricultural capital assets; livestock inventories; changes in livestock inventories and the reasons for them; livestock sales and sale values; family size decomposed by gender and age; and labor-hiring.

Detailed work in subsequent seasons has updated and expanded the baseline data set while addressing the following themes: agricultural extension and related government services (1986–87 and 1991–92); drought and coping mechanisms (1992–93); environment and sustainable agricultural production (1993–94); changes in rural welfare over time; gender and decision-making (1994–95); structural adjustment, the HIV/AIDS epidemic and the social and economic consequences of marital instability (1995–96); and poverty, risk, investment, diversification and social networks (1996–97).

As suggested above, the households in the panel are not typical of rural households in many parts of Zimbabwe. Although families were initially meant to be selected for the resettlement program because they were landless or relatively poor, they have been given access to superior resources and have used it to build up a base of assets, particularly livestock. Ninety percent of households now own cattle, with an average holding of some 10 animals. This pattern contrasts sharply with that for the poor communal areas surveyed by Corbett (1994), where half of the households owned no cattle (in 1990) and the mean herd size was less than three animals, and by Scoones (1996), where 55% of households owned no cattle prior to the 1992 drought. In more-favored communal areas, the proportion of households owning at least some cattle ranges from 70 to 80% (See Moyo, 1995 and Zindi and Stack, 1992). In Mutoko communal area, spread across NRs III and IV, even in the

lowest income decile 40% of households owned cattle in 1985, after three years of drought (Coudere and Marijsse, 1988). Such comparisons are at least suggestive that our panel households, 58% of which owned cattle at the time of the baseline survey in 1983–84, started from a base no better than most rural households but have nevertheless achieved dramatic gains.

3. COPING WITH THE 1991–92 DROUGHT

The 1992 drought is widely portrayed as the worst this century. The exceptionally dry conditions in January and February of 1992 crippled agriculture as crops withered and livestock perished in their thousands. Rivers, dams and boreholes dried up in the middle of the rainy season, and the face of the countryside changed. Food queues became a common feature in urban areas as supplies dwindled and prices rocketed.

The seriousness of the post-1980 droughts shows up clearly in the survey data. Figure 2 depicts the strong relationship between rainfall (even when national averages are used) and the annual production of maize by households in the panel. Maize production, which among panel households had been over three tonnes per family in 1991 and which recovered to above that level in 1993, dropped to an average of less than half a tonne in 1992. Maize yields displayed a similar pattern with over two tonnes/ha achieved in 1991 and 1993 but only 47 kg/ha in 1992.⁹

The consequences for consumption and income of the volatility in maize production can readily be seen from Figure 3. Maize sales are determined largely residually. Once the household's consumption requirements have been met, the balance of maize production is marketed.¹⁰ On average, households retain some 1,500 kg of maize (about 150 kg per resident household member) to meet their staple consumption requirements. Following drought, retentions rise—as households rebuild stocks—and then level off again. For example, the mean amount of maize retained in each of the immediate pre-drought years shown in Figure 3 is 1,496 kg whereas in each immediate post-drought year it is 1,634 kg.

The effect of drought on food consumption has three components. First, to the extent that consumption smoothing fails, consumption, of course, falls below what it would be in the absence of drought. Second, consumption smoothing is partly achieved through public action; for the families in the panel, food consumption was maintained partly through the government's drought relief program. Zimbabwe's government has acted in a number of ways to attempt to mitigate the impact of repeated droughts, although

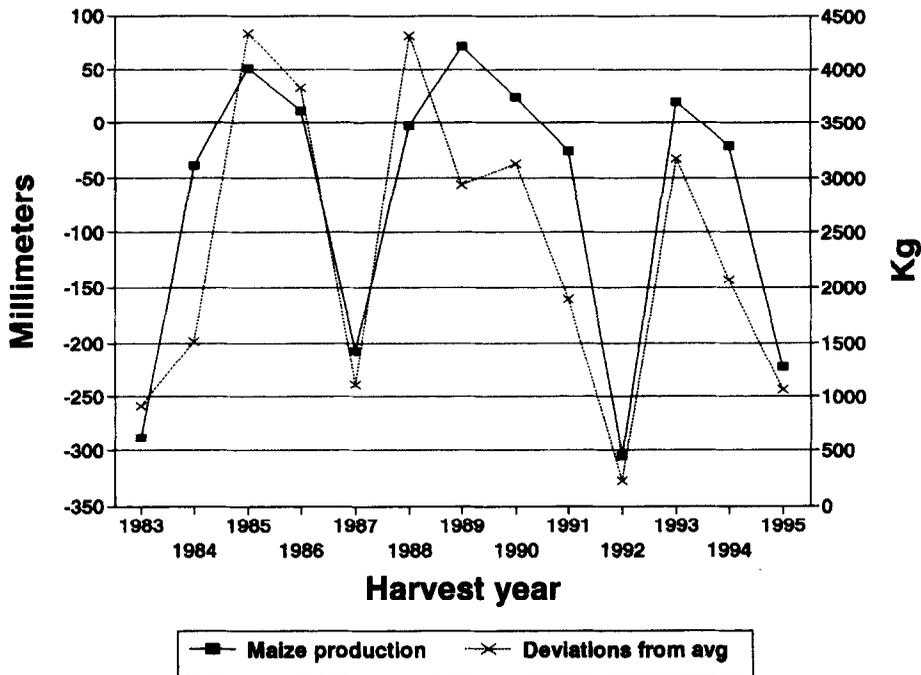


Figure 2. Deviations from long-term average national rainfall (left scale) and average maize production per household (right scale).

the extent of its action has been impeded by the adverse consequences of successive droughts on the government budget.

The main form of relief provided by the state is household income support, much of it in the form of food. The food component, operated by the Department of Social Welfare (DSW), has been in two categories: free food distributions for the elderly and the disabled, and distributions on the basis of participation in food-for-work programs for destitute families with able-bodied members. In January of 1992, some 873,000 persons were assisted (out of 2.1 million registered for assistance). When numbers of those registered escalated and as food stocks ran down, the official ration was progressively cut from 15 kg of grain per person per month to 10 kg and then to 5 kg¹¹ (Gillespie, 1993). By November, the number registering had reached 5.6 million—or 75% of the rural population (Hicks, 1993).

In addition, food programs target young children. A national Children's Supplementary Feeding Program (CSFP) was established soon after independence and was reaching 250,000 children by 1984. Although the CSFP was phased out in favor of a replacement program that emphasized production of supplementary foods, it was reinstated on a much larger scale than previously in response to the 1992 drought (Tagwireyi and Greiner, 1994). During

1991–92, one million children under the age of five benefited from the scheme.

Income support is also provided to needy households in the form of assistance with school and examination fees and the seed and fertilizer packs distributed before the subsequent planting season.¹² In addition, prior to 1995, it was possible for households to raise cash through participation in public works programs.

Finally, households may shift expenditure from nonfood to food items or raise cash in various ways and use the resulting income to buy food. In this paper we focus on this third component, that is households' own consumption-smoothing mechanisms. We first briefly consider the other two components.

(a) Failures of consumption smoothing

Some idea of the necessity to smooth consumption is given by the fact that many households in the panel regularly fail to grow enough food to feed themselves (Table 1). Depending upon Natural Region, families can on average expect to experience a shortfall in home-produced food every three or four years, a finding also illustrated in Figure 3.

Since the panel data do not measure consumption, we cannot estimate to what extent consumption

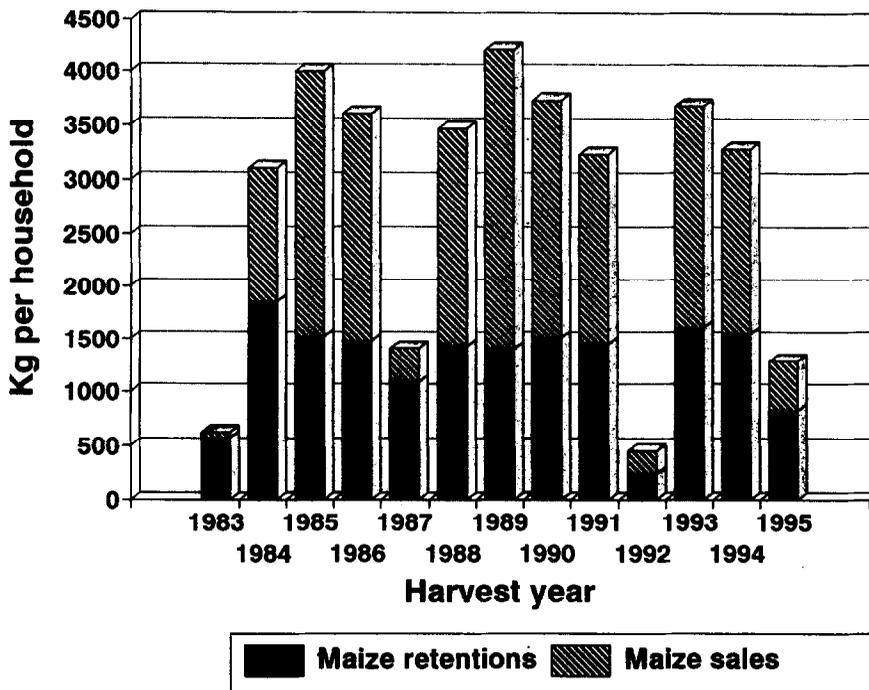


Figure 3. Average household maize retentions and sales, harvest years, 1983-95.

smoothing was effective. There is clear evidence, however, that food consumption fell in spite of the various smoothing mechanisms used. One indication is that during the drought households sharply reduced the frequency of meals. At the peak of the 1992 drought almost 30% of the panel households took only one meal per day and another 50% only two meals. A reduction in the number of meals taken daily is a common seasonal phenomenon during the hectic period when plowing, planting and weeding all go on simultaneously, however in 1992 there was

no fieldwork to be done once the initial plantings died and the rain failed to return.¹³ In addition, a large majority (nearly 70%) of households reduced the quantity served at meals. Also, about a third of households consumed "wild foods" in this period. These foods include edible, naturally occurring plants, fruits and seeds as well as animals and insects. The great majority (80%) of those who did not consume wild foods stated that they would have done so if wild foods had been available in their locale. The use of wild foods correlates clearly with

Table 1. Crop failures and adequacy of household food production

Indicator	Natural Region		
	II	III	IV
Crop failures: Mean percentage of years during 1981-93 that inadequate food was produced to feed the family	17.8	23.6	20.7
Modal percentage of years with inadequate food	16.7	25.0	25.0
Percentage of families producing inadequate food in 30% or more of seasons between 1981 and 1993	24.2	53.7	60.9

Source: Derived from Kinsey (forthcoming).

stress: the percentage of households eating wild foods differs sharply among agroecological zones, ranging from a low of 35% in NRII, the most environmentally favored region, through 84% in NRIII to 92% in NRIV.¹⁴ There is however no correlation between the use of wild foods and availability of food from drought relief, since virtually all families received drought relief. Families of cattle-owners were slightly more inclined to consume wild foods than those of nonowners, but the correlation is not significant.¹⁵

(b) *Consumption smoothing through state assistance*

To the extent that consumption of non-wild foods could be maintained, consumption smoothing took place. As noted, some of this other consumption partly reflects public action. Since there is obviously

some idiosyncratic risk in agricultural production, households may face food shortages even in a good year. Some indication of this is shown in Table 2, which indicates that in every year a few percent of the panel households received drought relief or food aid.¹⁶ But, a major drought such as occurred in Zimbabwe in 1991–92 represents highly covariant risk. All households were affected, and this is reflected in the large increase in the use of food aid in 1991–92 and the following year. In 1992–93, 98.6% of the panel households received food under the government drought relief program, and more than 83% had been receiving food monthly for six months or more at the time of the 1993 survey. During the same period, public works schemes were either the first or second most important source of spending money for some 36% of the families in the panel. The proportion of households that received food aid in the earlier 1983–84 drought year was

Table 2. *Percentage of the panel households receiving drought relief and/or food aid by season*

Harvest year														
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
(percentage)														
3.9	3.4	3.9	79.2	4.2	1.5	2.9	2.4	1.2	2.1	6.8	26.8	98.6	5.8	86.6

Source: Panel survey, various years.

Table 3. *Sources of cash used to buy food during serious droughts, 1992 and 1995, projected and actual*

Source of cash	1992		1995/96			
			Projected		Actual	
	Mean amount raised	Percentage of panel	Mean amount quoted	Percentage of panel	Mean amount raised	Percentage of panel
	(Z\$) ^a		(Z\$) ^a		(Z\$) ^a	
Take a new loan	61	3.6	203	8.5	68	3.7
Use cash holdings/savings	438	27.6	373	17.1	337	27.1
Take a job in this area	250	17.6	339	21.1	308	22.4
Take a job elsewhere	15	19.6	35	17.7	387	11.1
Sell cattle or other stock	648	63.1	1,080	64.6	1,112	60.2
Sell personal effects	0	0.0	0	0.0	0	0.0
Sell farm equipment	0	0.0	0	0.0	0	0.0
Sell household effects	1	0.3	1	0.3	0	0.0
Sell firewood, wild fruit, thatching grass, etc.	0	0.0	0	0.3	0	0.0
Sell other items ^b	76	15.5	81	18.5	516	18.7
Pan for gold	32	6.2	16	2.1	93	11.4
Other actions	122	13.8	116	10.3	190	10.3
Total	1,653		2,244		3,011	

Source: 1993, 1995 and 1996 surveys.

^a Z\$ denotes Zimbabwe dollars.

^b Chiefly hand-irrigated vegetables, second-hand clothes and craft goods.

79%, with considerable variation by Natural Region. To illustrate, drought relief in the form of food aid was received by 66% of households in NRII, 97% of those in NRIII and all households in NRIV.

(c) *Consumption smoothing through private mechanisms*

We now turn to private mechanisms of consumption smoothing. Families were asked what methods they used to raise cash to buy food during the 1992 drought. The responses are shown in the appropriate columns of Table 3. The table gives both the percentage of households using a particular method and the mean amount (taken over the entire panel) of money raised in this way. The first thing to note is the magnitude of the response. The mean amount raised for extra food purchases was Z\$1,653, equivalent to 77% of the mean value of maize

production per household in the previous year. Over 60% of the panel sold livestock in 1992, and just under 40% of the total amount raised came from livestock sales.

Additional evidence on the private means employed to smooth consumption is shown in Tables 4 and 5, which compare sources of spending money just prior to the 1992 drought and approximately one year later, when the impact of the drought was near its greatest.¹⁷

In a normal season, 1990–91, sales of field crops and vegetables were by far the most significant sources of families' disposable income (Table 4). Livestock sales were of very minor importance. One year later, in the grip of the drought, things had changed considerably. The importance of selling crops and vegetables¹⁸ had dropped by 50%, the importance of urban-wage income as a primary source had risen 20-fold and a much wider range of other sources was given (Table 5).

Table 4. *Most important sources of the family's spending money immediately prior to the 1992 drought*

Source of income	Ranking of importance of the income source		
	1st (n = 280)	2nd (n = 136)	3rd (n = 14)
	(percentage of all responses)		
Husband's wages-urban job	0	1.0	0.0
Children's wages-urban jobs	^a	1.9	^a
Relatives' wages-urban jobs	0.0	^a	0.0
Craft activities	^a	1.2	^a
Selling own crops, vegetables	59.1	3.5	^a
Other	5.6	24.0	2.1

Source: 1992 survey.

^a indicates a value less than 0.05%.

Table 5. *Most important sources of the family's spending money 10 months after the failure of the 1992 harvest*

Source of income	Ranking of importance of the income source		
	1st (n = 444)	2nd (n = 313)	3rd (n = 101)
	(percentage of all responses)		
Husband's wages-urban job	1.7	^a	0.0
Children's wages-urban jobs	3.4	2.6	0.8
Relatives' wages-urban jobs	^a	0.8	^a
Craft activities	1.3	4.3	1.5
Selling own crops, vegetables	31.5	7.7	2.2
Borrowed money	^a	1.6	0.7
Public works programs	5.2	9.4	3.3
Savings	1.5	1.2	0.9
Other	6.4	8.4	1.7

Source: 1993 survey.

^a indicates a value less than 0.05%.

Responses in the *other* category in Table 4 numbered 136. The most important of these was gardening and selling vegetables, which provided a source of income for 30% of households. Second in importance was working as a casual laborer, which yielded an income for just under 4% of families. Selling of livestock following the 1991 harvest was a source of income to only just over 1% of households.

There were 143 responses in the *other* category in Table 5. The most important of these was gold-panning, which provided a source of income for 25% of households.¹⁹ Second in importance was the selling of cattle and milk, which yielded an income for 24% of families.

The results suggest that some of the mechanisms discussed in the literature are largely irrelevant among the panel households in Zimbabwe. The panel appears to make little use of credit, either formal or informal, as part of a consumption-smoothing strategy. Less than 4% of households reported taking out a loan to finance food purchases (Table 3) and the amounts involved are very small. Moreover, unlike the patterns observed in parts of Asia, for example, households in rural Zimbabwe do not—except in very rare cases—sell personal items (such as jewelry or watches), household effects (such as furniture) or items of agricultural equipment to raise cash during drought emergencies.

The flow of remittances in cash or kind from urban-based relatives to rural households is a common phenomenon in southern Africa and in many areas of Zimbabwe. Scoones, for example, indicates that 76% of households in a dry communal area in Zimbabwe made use of remittances during the drought year 1992 (1996, p. 178) and that remittances were the second most important coping mechanism after government aid. Such flows have never been of the same importance for households in the panel. In the 1983–84 period, some 18% of panel households received remittances in the form of food and 13% in cash. The figures were not substantially different in 1986–87 or 1991–92. At the peak impact of the 1992 drought, remittances in the form of food were received by 23% of households and in cash by 18% of households. Tables 4 and 5 also support the conclusion that remittances play a minor role in consumption smoothing.

The evidence from the panel suggests that resettled families in Zimbabwe employ three main coping mechanisms. First, households raise cash through off-farm work. This method is likely to be of increasingly limited effectiveness in coping with risk since food-for-work programs have been replaced by a grain-lending scheme and since employment opportunities are local, largely in agriculture and therefore subject to a problem of

covariance: labor demand will fall in drought years. This is confirmed by the 1996 panel survey. In 1996, in over 90% of the cases in which households reported off-farm activities, the work was agricultural. The 1995 data also indicate a strong geographic concentration: 89% of the jobs were within the same village.

Second, use of cash holdings or savings was reported by over a quarter of households in 1992 (Table 3) and this method provided 27% of the cash used for food purchases. The use of savings accounts by the panel households has grown rapidly.²⁰ The proportion of households with at least one savings account grew from only 6% in 1980 to 52% in 1995. The growth in the number of accounts has been steady with the notable exception of the drought years. The 1991–92 drought was reflected in a fall of 36% in the number of savings accounts over 1992–93. One good season, however, saw the number of accounts restored; the percentage of households with accounts, which had dropped from 42% in 1992 to 27% in 1993, recovered to 47% in 1994 with mean balances rising by 66% over 1993–94. Cash holdings and savings accounts are however unattractive assets in Zimbabwe. In recent years inflation has fluctuated between 22 and 42% and interest rates on savings accounts have been negative in real terms.

Third, households sold livestock to raise money to buy food. Indeed, it is clear from Table 3 that this was by far the most important response to the 1991–92 drought, both in terms of the number of households using the method (almost two-thirds of the panel) and in terms of the amount raised, an average (over all households, including those who did not sell livestock) of Z\$648.²¹

Cattle ownership has risen rapidly among panel households; the proportion of households with cattle rose from 58% in 1983 to 90% in 1995 and herd sizes for cattle owners grew from about four to just under 10 head²² (Figure 4). Figure 5 shows that the 1992 drought was accompanied by a sharp rise in the number of cattle lost and an increase in sales, over and above the trend increase which corresponds to the growth in herd size. Figure 5 vividly illustrates the limitation of the use of cattle as an asset for consumption smoothing. The increase in sales, presumably the intended response, is swamped by the increase in losses, the unintended effect of the drought. In addition, cattle prices will be low in a drought period both because supply is unusually high and because the animals sold will be in poor condition as a result of the drought (See Figure 7 and the related discussion).

Table 6 shows the number of cattle sold as a percentage of the opening stock and as a percentage of the total disposals from the family herd for the early 1980s and the four most recent seasons. The table reveals that cattle sales were

indeed relatively large in 1992, but also that the addition to the average herd in that year was modest. This reflects what is probably the most important fact about cattle and consumption smoothing among panel households: the value of cattle owned is now large relative to the cash needed for consumption smoothing in even a serious drought year. Since drought sales are small relative to herd size, herds are quickly rebuilt after a drought, as shown in Figure 4. And, as indicated in Figure 5, sales account for an increasing proportion of disposals from family herds over time.

The panel means which we have so far considered suggest two conclusions. First, consumption

smoothing does not stand in the way of accumulation: cattle ownership has grown rapidly in spite of the importance of cattle sales at times of drought. Second, since average cattle ownership in normal years is large relative to sales in drought years the problem that stocks cannot be negative (the household cannot be in debt in terms of cattle) appears unimportant. The problem of zero stocks (as a result of a series of negative shocks) which looms large in the simulation analyses of Deaton (1990) and Dercon (1992) is not relevant for our population as a whole.

If, however, the panel is sufficiently heterogeneous, the reduction in herd size may, of course, be large for particular groups of households.²³ Figure 6

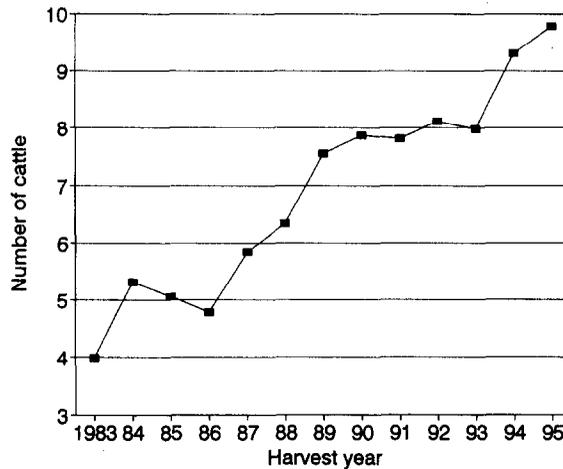


Figure 4. Mean herd size for panel households, 1983-95.

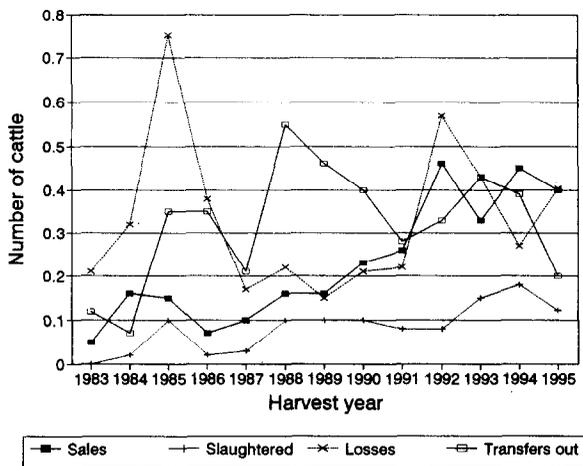


Figure 5. Disposals from family herds, 1983-95.

Table 6. Cattle sales in relation to changes in herd size, 1983–84 and 1992–93 to 1995–96

	Season				
	1983–84	1992–93	1993–94	1994–95	1995–96
Sales in the previous 12 months as a percentage of herd size 12 months prior to the survey	1.6	8.4	3.4	4.3	8.2
Animals:					
Mean decrement in herd size	0.99	2.61	1.57	0.93	1.70
Mean increment in herd size	1.10	0.96	1.00	1.66	2.13
Sales as a percentage of the decrease in herd size over the preceding 12 months	17.0	40.6	28.7	49.3	59.0

Source: Surveys for the years indicated.

Results in the table are not strictly comparable with those in Figures 4 and 5.

displays percentage changes over the 1992–93 season in the size of the herd owned by households. This figure shows that 2% of households lost their entire herd in the drought period, while nearly another 5% of herds was reduced by 50% or more. For this subgroup, sales of cattle accounted for half (50.4%) of the decrease in the herd size. Altogether, more than 20% of households experienced negative changes in herd size ranging up to 50%. In contrast, about one-third of the panel managed to increase their herd size even in this very difficult year. The most common pattern however was for net herd sizes

to remain unchanged; sales of cattle were made from these herds but such disposals were compensated for by births, purchases or transfers in.

Heterogeneity of cattle ownership was addressed by stratifying herds according to four size groups: 0–3 head, 4–6 head, 7–12 head, and 13 or more head; and changes in herd size were then assessed over the worst drought-affected period in 1992–93. Those households with three or fewer cattle have inadequate numbers to provide both draft power and a reliable basis for a breeding herd, while those with herds in the two largest groups are likely to possess

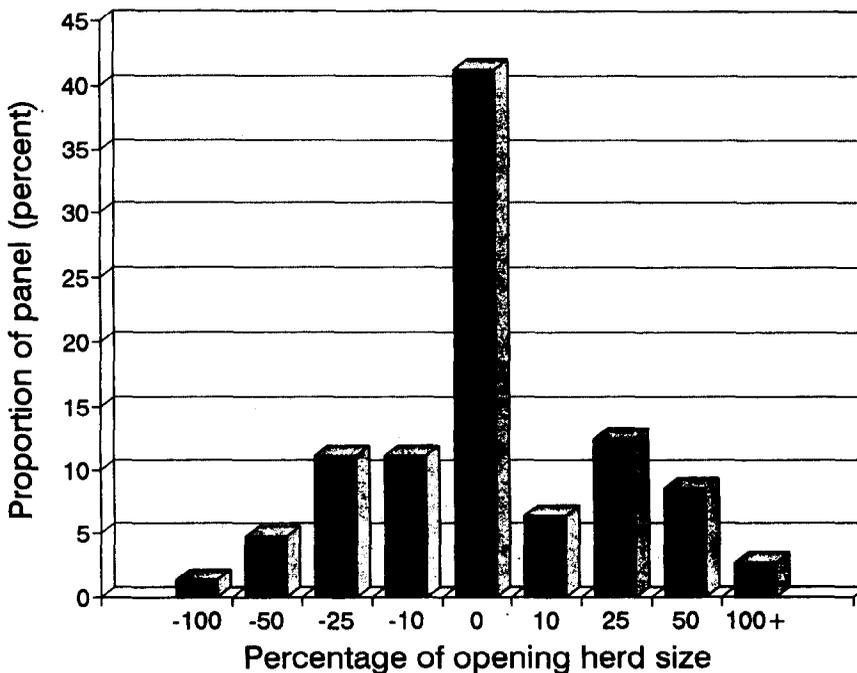


Figure 6. Percentage change in the size of herds owned by households in relation to opening stocks of cattle, 1992–93 season.

adequate draft power, a source of milk and the basis for fairly regular commercial sales. Households in the smallest category were both more likely than any other group to lose their entire herds and (largely because of the inclusion of those with no cattle) more likely to experience no change in herd size. Surprisingly, however, almost a quarter of herds in this size category grew by 50% or more. At the other extreme, no herd in the two largest groups was entirely wiped out by the drought, although herds in these groups were more likely than others to lose 50% or more of their numbers. Significant proportions of the herds in the top three size categories also increased their numbers by between 25 and 50%, as reflected in Figure 6.²⁴

In summary, the evidence in Table 3 (which reports households' responses) suggests that the three most important adjustment mechanisms are the sale of livestock (which accounts for 39.2% of the total amount raised for food purchases), the use of financial assets (26.5%) and additional employment (15.1%). Taken together the three mechanisms account for over 80% of the cash raised to buy food. This finding is corroborated by what households reported about other households. Asked (in 1994) which households in their community were most vulnerable during the drought, the characteristics mentioned most often were: those with many dependents (cited by 21% of households), those without nonagricultural income or employment (16%) and those without livestock (16%). Conversely, the households least at risk at the time of the drought were described (Table 7) as those with nonagricultural income (31%) and those with livestock (23%). It is interesting to note that the characterization "those with savings" was used by only about 5% of respondents, confirming that the

use of liquid assets in consumption smoothing is rather unimportant in Zimbabwe.

4. MORE RECENT COPING STRATEGIES

The 1992 drought was only the most pronounced to affect Zimbabwe since independence. The three-year drought of 1982–84 killed large numbers of livestock and caused many of the households in the study to default on loans which have never since been repaid. Only the late rains in 1984 prevented many households from having three consecutive disastrous harvests. The droughts in 1987 and 1995, like that in 1992, were single-season events which resulted in severe shocks to the production of maize, Zimbabwe's staple grain. Almost two million people nationwide were receiving drought relief in late 1994 (Eilerts, 1994). This figure had risen to 5.8 million by July 1995, when the cost of the drought relief program for 1995–96 was estimated at Z\$2 billion (*Herald*, July 29 1995). The 1995 drought was declared a national disaster in the middle of that year; it was estimated that half the country's population would require emergency feeding by early 1996 accompanied by a food import bill of some Z\$1.9 billion (*Herald* July 29 and August 8 1995).

It was estimated that at least 934,000 children would need supplementary feeding under the CSFP during 1995–96 (*Herald* April 29 1995). In addition, the estimated amount spent on school feeding programs during 1995 was Z\$20 million (*Herald* April 11 1996). Income support in the form of school and examination fees assisted more than 265,000 pupils at a cost of Z\$53 million (*Herald* April 11 1996).

Table 7. Respondents' characterization of households least at risk during the 1991–92 drought

Respondents' characterization of households least at risk during the 1991–92 drought	Number of responses	Percentage of responses
Those with nonagricultural income	154	31.2
Those with livestock assets	113	22.9
Those with crop sales or stocks	49	9.9
The hardworking ones	37	7.5
Those with few children	37	7.5
Small families	27	5.5
The wealthy (those with cash savings)	25	5.1
Good farm managers	11	2.2
Those with a flow of remittances	10	2.0
Those with equipment and/or inputs	7	1.4
Those with water-retaining soils	6	1.2
Those with an active, working, male head	4	0.8
Other	13	2.6
Total	493	100.0

Source: 1994 survey.

In the face of these demands, the core budget for the Department of Social Welfare declined in real terms by some 50% from 1990–91 to 1994–95. In order to try to continue to provide the income support function of the drought-relief program with reduced resources, the DSW announced a major transformation under which the program was to be turned into a grain-loan scheme. Under the scheme, households were allowed to borrow maize from the government with the idea that the maize would be repaid after a good harvest. Grain loans were disbursed in three tranches with the first in May 1995, followed by another in September and a third in December 1995 and January 1996. The final tranche was expected to benefit about six million people (*Herald* December 12 1995).

In 1994, households were asked whether they considered the risk of a serious drought to be greater than 10 years earlier. This question was asked both for the risk to the household itself and for its perception of the risk to other households in the community. Households which perceived themselves

to be exposed to more risk than before were, unsurprisingly, predominantly those which had just experienced a bad harvest, those who now had more dependents than 10 years earlier and those who had no assets to sell or stocks to use. But, two-thirds of the households reported in 1994 that they saw the risk as less than 10 years earlier in spite of having experienced a very serious drought in 1991–92. It is interesting to note what reasons these households gave for reduced risk (Table 8). Many reported that rains were good. In addition many stated that stocks are now held on-farm and sales deferred until later in the year.²⁵ In addition, 10% declared that they now have assets (which in this context means livestock) which can be sold.

Similarly, over two-thirds of households stated that there would be fewer households at risk in case of another serious drought than 10 years previously. The dominant reasons (Table 9) are a combination of individual strategies to cope with drought—“forecast, plan and hold stocks”—and factors beyond the control of the household—“good

Table 8. Respondent feels that there is less risk of drought-caused food shortage for his family than there was 10 years previously

Reasons cited as to why risk is less now	N	Percentage
Good rains/harvest was good or average	113	39.8
Forecasts, plans and holds stocks	98	34.5
Livestock/assets are held for sale	29	10.2
Has nonagricultural income/remittances	20	7.0
Has fewer dependents	6	2.1
Government will provide	6	2.1
Hardworking/sheer effort/labor inputs	5	1.8
Has markets for output	3	1.1
Farm management is good	3	1.1
Has more land	1	0.4
Total	284	100.0

Source: 1994 survey.

Table 9. Respondent feels that fewer households in the community are at risk of serious food shortages in the next drought than in the past

Reasons cited why fewer are at risk now	N	Percentage
Forecast, plan and hold stocks	112	36.7
Good rains/harvests	78	25.6
Hold livestock assets to sell	46	15.1
Farm management is good	25	8.2
Have nonagricultural income/remittances	18	5.9
Government will provide	10	3.3
Hardworking/put in effort	6	2.0
Have income now/can buy food	5	1.6
Draft power has increased production	3	1.0
Purely local factors	2	0.7
Total	305	100.0

Source: 1994 survey.

rains/harvests." However, immediately following in importance is the answer that households now have sufficient livestock to be able to sell some if drought recurs.

The ways in which households projected they would raise money to buy food in 1995 are compared with the actual methods used in the last four columns of Table 3. The actual amount of money raised during the 1995 drought was lower than projected for loans, savings and local employment, and there was no selling of household effects or natural products. The amount raised was higher than projected for distant employment, sales of livestock and other items (chiefly crops), panning for gold and other actions. The mean amount actually raised in 1995 was Z\$3,011, equivalent to 98% of the mean value of maize production per household in the previous season.

In both 1995 and 1996, transfers in the form of remittances in cash or kind remained at about the same levels as in 1992. About a quarter of households received cash transfers in these two years, and most of these came from bridewealth payments. The average amounts received across the panel however were small—about Z\$200 per household, of which some 42% was used to purchase food.

During the 1995 drought, the grain-lending program operated somewhat differently in different parts of the country. In areas where applications were invited, 87% of the panel households applied for an average of 1,202 kg of maize each. This amount of maize is somewhat less than the normal level of retention by the average panel household (See Figure 3). It is thought that this level of demand for food aid

probably overstates the true need for aid. Many households will have applied, or applied for more than was necessary, in the hope that the government would never enforce repayment of the loan. Seven per cent of households did not apply for grain loans in 1995 either because they harvested enough in the previous season (three-quarters of those not applying) or because they intended to use savings to finance grain purchases. Just over 2% of the panel applied for loans but were turned down.

In the mid-1990s, the probability that the 1991–92 drought would be followed by another as serious within five years was perceived as very high: 89% of the panel considered this event likely, 51% even saw it as "certain." Nevertheless, few households (only 35%) stated that they were preparing for such an eventuality. These households were accumulating cash or savings accounts balances or were storing grain. Households were also asked in early 1995 what they would do if the following season (1995–96) were a drought year. The results are shown in the final two columns of Table 3. Comparing the two strategies for financing food purchases in case of drought—the actual drought in 1991–92 and the hypothetical one in 1995–96, we find that the results are very similar. As before, three methods account for over 80% of the mean amount of Z\$2,244 which households expected they would be able to raise: cattle sales (which account for 48% of the total), use of cash balances or savings accounts (17%) and off-farm work (15%). This confirms that households hold substantial wealth in a form which can be used for consumption smoothing. With less wealth, smoothing would lead to hysteresis: having used assets in one year,

Table 10. *Reasons for all sales of all livestock, 1994 and 1995*

Reason	1994		1995	
	No.	Pct.	No.	Pct.
Buy food	122	45.0	95	39.6
Educational expenses	49	18.1	44	18.3
Buy seeds/fertilizer	27	10.0	43	17.9
Health expenses	16	5.9	4	1.7
Buy other goods	10	3.7	7	2.9
Buy implements	8	3.0	15	6.3
Pay for use of land	4	1.5	2	0.8
Repay loans	4	1.5		0.0
Travel expenses	3	1.1		0.0
Help relatives	2	0.7	3	1.3
Pay for labor	2	0.7		0.0
Bridewealth		0.0	10	4.2
For repairs		0.0	2	0.8
Buy livestock		0.0	2	0.8
For building materials		0.0	5	2.1
Other	24	8.9	8	3.3
Total	271	100.0	240	100.0

Source: 1995 and 1996 surveys.

households would not yet have sufficiently rebuilt their asset base to be able to cope with a subsequent drought. Other methods would have to be found or consumption smoothing would be impossible.

Table 10 shows the reasons given by the households for their livestock sales in 1994 and 1995. Money is of course fungible and the distinctions should therefore not be taken as fixed. Nevertheless, it is notable that the ranking is the same in the two years: first, food purchases, then education expenses followed by purchases of farm inputs (seeds, fertilizer).²⁶ Clearly, in our panel, livestock has become a productive asset with a return in normal years which consists not only of milk, draft power, meat and skins but also of the value of sales. Sales are a normal and substantial part of the return to livestock ownership in nondrought years: in 1994 and 1995 those who sold cattle sold on average between one and two animals, equivalent to 11–13% of their herds. This finding shows that livestock represent a fairly liquid asset, an outcome that contrasts with many other African countries, and many parts of Zimbabwe, where typically smallholder livestock ownership is smaller so that indivisibilities become much more important. In the panel, the sale of a single animal represents on average a reduction in the household's herd of only 11%.

In addition, livestock generally compares favorably with other liquid assets: the returns to cash and savings accounts are heavily negative. Figure 7

indicates that farmers, depending upon the timing of cattle sales, had an equal chance of receiving a price in real terms better or worse than the 13-year average price. Those who sold in 1992, for example, received a price that averaged in real terms 30% less than the average sale price two years earlier. The level of cattle sales appears responsive to prices (compare Figure 5) with the exception of the severe 1992 drought and the immediately preceding year. The oversupply of animals in relatively poor condition through distress sales in both 1992 and 1993 helped to drive down prices.

What is most striking however is the evidence in Figure 8 supporting the conclusion that households in the panel have been successful in accumulating real wealth through assets in the form of cattle.²⁷ Drought, as noted earlier, causes setbacks to asset accumulation, but it does not destroy the asset base completely. By the time the 1992 drought came along, households held sufficient numbers of cattle to be able to smooth consumption effectively through higher levels of sales in the face of reduced sales values.

The data available also tell us something about herd management strategies and recovery from drought across different agro-ecological zones. Because transfers of cattle among kin and in payment of bridewealth can be important elements in determining changes in herd size, it is important to differentiate between growth in numbers arising

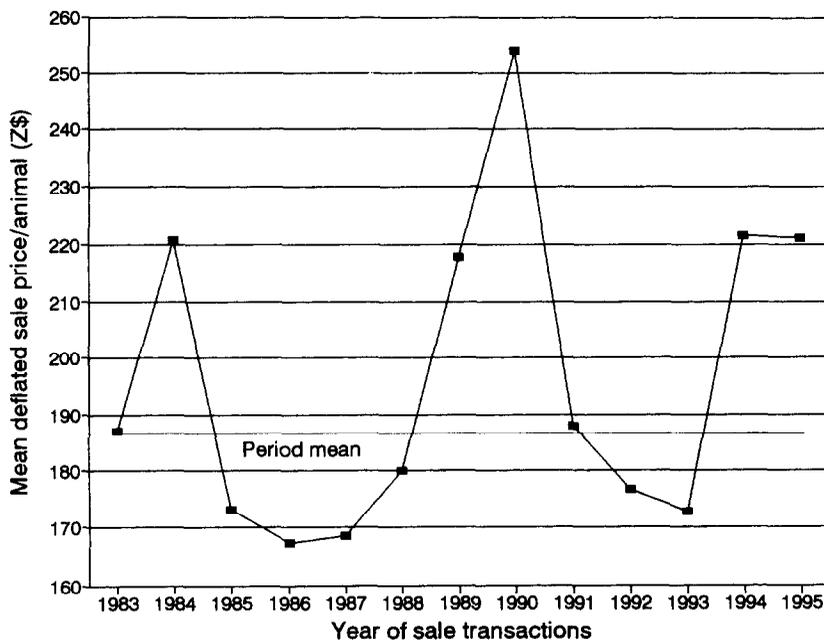


Figure 7. Average sale price of cattle in real terms by year of transaction.

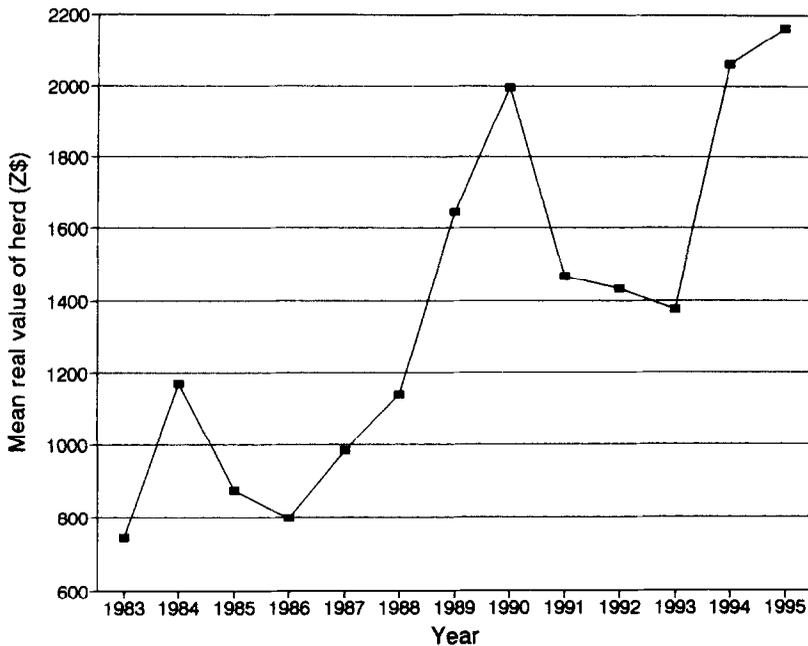


Figure 8. Value of the average family herd in real prices, 1983–95.

from transfers and that from purchases and natural increase.²⁸ Two measures of herd size are therefore used here in an attempt to make this discrimination. The first is based on the number of cattle owned by a household,²⁹ while the second defines the herd as the sum of the number of cattle owned and the number not owned but being looked after for someone else. Table 11 sets out the two measures of herd size and indicates, by Natural Region, the proportion of the panel possessing cattle in the three years following the severe 1992 drought.

The first thing to note is that recovery from the drought in terms of cattle ownership occurred at

about the same rate in all three areas. The increase in numbers of cattle owned over the period shown in Table 11 ranges from 16 to 19%, or 8 to 9.5% a year.³⁰ A somewhat different picture emerges when total herd size is considered. Total herd size in NRIII and NRIV increased only some 12–13%, or about 6–6.5% a year (the B columns). These changes are about the same as those in the A columns, an indication that natural increase and purchases were more important sources of herd growth than caretaking. The change in total herd size in NRII—27%—was however larger than the change in cattle ownership and more than twice that of the other two

Table 11. Regional differences in recovery from drought: Ownership and mean herd sizes

Area	1993				1994				1995			
	Mean herd size		Proportion with cattle		Mean herd size		Proportion with cattle		Mean herd size		Proportion with cattle	
	Owned	Total	A	B	Owned	Total	A	B	Owned	Total	A	B
(no.)		(%)		(no.)		(%)		(no.)		(%)		
NRII	8.4	8.5	91.7	91.7	9.3	9.7	90.9	91.3	10.0	10.8	90.4	90.8
NRIII	8.0	8.3	94.0	94.0	9.4	9.5	89.2	90.2	9.3	9.4	88.0	88.0
NRIV	8.5	9.1	83.5	83.5	8.5	8.6	89.8	89.9	10.2	10.2	93.9	95.5

Source: Surveys for the years indicated.

A: On the basis of cattle owned.

B: Including both cattle owned and cattle not owned but cared for.

areas, suggesting that caretaking became much more important in this area of highest environmental potential.

The fact that columns A and B are identical for all areas in 1993 tells us that cattle in that year were given for caretaking only to those who already possessed cattle, an unsurprising finding. Over the following two years however the pattern changes somewhat. Caretaking in 1994 and 1995 tends to increase the proportion of farmers with cattle—the figures in the B columns exceed those in the A columns, an indication that cattle to a small extent at least were being put into the care of those who previously did not own them. Overall, however, the proportion of households with cattle declines in the two more-favored natural regions

The suggestion that caretaking increased in importance in NR II is confirmed when the phenomenon is examined in more detail. Farmers in each of the three areas appear to have followed somewhat different recovery strategies. Caretaking declined steadily in importance in NR III as the drought was left further behind and as pasture improved; 10% of households were caretaking in 1993 but only 2% in 1995. In contrast, in NR II caretaking increased rapidly from 3% of families in 1993 to 12% in 1995, when, on average, each herd-owner was keeping almost one animal belonging to someone else. In this year, the 12% of panel households caretaking cared for an average of 6.3 head of cattle each, up from 3.7 head in 1993; and the numbers cared for ranged from 5 to 100% of total herd size. At the other extreme, in NR III only 1% of households cared for others' cattle, with an average of one head each, equivalent to 6–15% of the numbers owned. NR IV was intermediate but more closely

resembled NR III than NR II. Only 2% of families caretake in NR IV in every year, and it is always the same families.

Growth in average herd sizes has been sustained despite sales by panel households. A natural question is whether the mean figures conceal important differences in cattle sales strategies not only across the three agro-ecological zones but also by size of cattle holding. We accordingly divided cattle-owners into two groups for each NR: those with herds below the mean size and those with herds at or above the mean. We then calculated annual sales for 1992–95 as a proportion of each year's total decline in cattle numbers.³¹ The results are shown in Figure 9. With one exception, a broadly common pattern is observed. During 1993, when many of the effects of the drought on cattle were most manifest, sales accounted for less than half the reduction in cattle numbers in all areas and whatever the size of the herd. In part this is because both deaths and sales peaked the previous year; disposals in 1993 often occurred in the form of slaughtering animals unfit for sale and which would have died anyway (see Figure 5). By 1995, sales had recovered to become generally the most common means by which cattle left herds, another indication of the importance of cattle sales as a regular source of income among panel households.

What is striking in Figure 9 is the evidence of the importance of geography in determining the levels of cattle sales. Although the proportions sold do differ somewhat with herd size, most cattle-owners appear to follow broadly similar sales strategies. In 1992, the relative position of the three NRs is exactly what would be expected: cattle sales are consistently more important in the more-

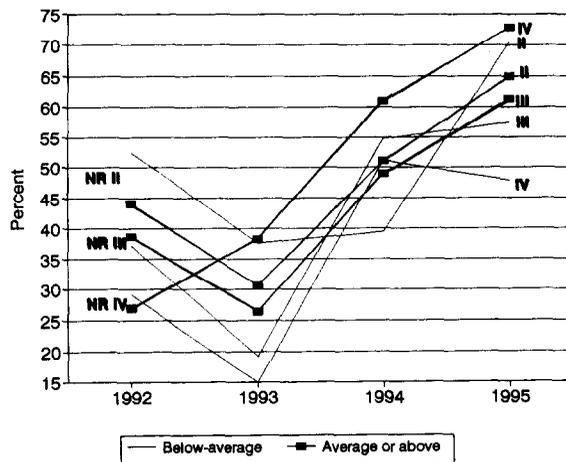


Figure 9. Annual cattle sales expressed as a proportion of each year's decrease in cattle numbers, by NR and size of herd relative to the mean, 1992–95.

avored areas. In 1995, again with one exception, the same is true.³²

We have noted that public action may substitute for private consumption smoothing. In the past, drought policies have not been well-attuned to local coping strategies; the tendency has been to provide a safety net for all, whether needed or not. Budgetary pressures in conjunction with the 1995 drought however compelled a change from outright food aid to a grain-lending program. Many of the farmers in our panel borrowed maize under the program during 1995, but many others did not and cited their reserves or asset base as the reason. In addition, many who did borrow were merely speculating reasonably that, as in the case of much government-provided credit in the past, repayment would not be enforced, and the loan would become a gift. Overall, panel households have low expectations that government will continue to provide drought relief. The evidence from the surveys is that most of the panel households have acquired sufficient wealth in the form of cattle to generate both a regular income stream and to cope with unusual demands without jeopardizing their asset base.

5. CONCLUSION

We have used a panel (with data from 1983–84 to 1995–96) of rural households in Zimbabwe to investigate the mechanisms used by these households to cope with risk. The principal risk for these households is that of food shortage as a result of drought. We have shown that the most important way in which the households in the panel cope with risk is through the sale of cattle. This is not only the case for intentions of dealing with a hypothetical future drought but also for the panel households' actual responses to other droughts, particularly that of 1991–92.

There is some use of the labor market for coping, with household members taking off-farm jobs when drought strikes. Work opportunities in the past however have come largely through the now superseded public works programs or through local agricultural piecework or day jobs, which are subject to a problem of covariance: labor demand is likely to fall during droughts. Households also use financial assets (cash balances and savings deposits) for consumption smoothing but only to a limited extent, possibly because of low real interest rates.

We have shown that cattle sales are the dominant response. The households in the resettlement panel have built up fairly large herds, and cattle ownership is now much more widespread.³³ Hence the problem discussed by Corbett (1994) and others that sales may reduce herd sizes below the threshold of viability is relatively unimportant for this group of

households in Zimbabwe. We have also shown that a significant proportion of the herd is sold in every year, so that cattle are a far more liquid asset than is usually credited (see, for example, Jackson and Collier, 1991). The Zimbabwe data contradict the suggestion in the literature that the use of savings for consumption smoothing is not compatible with accumulation. In fact, wealth in the form of cattle has grown enormously in the panel, in spite of the repeated occurrence of drought. As a result of this accumulation, few households in the panel are in danger of running down their assets completely and therefore being unable to smooth consumption through cattle sales.

This outcome contrasts sharply with the conclusion reached through analysis of the data from the 1990–91 national income, consumption and expenditure survey. This analysis concluded that "Greater homogeneity of households appears to occur in the resettlement areas, which is explained by each household having been allocated pieces of land of similar size," a statement with which we have little objection. The report however then goes on to note "These households are therefore almost uniformly poor, with few having been able to increase their income substantially above that of the rest..." (Zimbabwe, 1995, p. 29). We find little support from the analysis of our panel data for the conclusion of uniform poverty. Instead, we find that the households in the panel have almost uniformly improved their economic position through accumulation of cattle; some 90% of families now own cattle, with a mean herd size of 10 animals, acknowledged as the basis for a small-scale commercial livestock operation allowing for regular offtake (GFA, 1987). Cattle have provided one of main mechanisms by which people have been able to make better use of the land they have been given. The occurrence of poverty is thus bimodal. While cattle ownership has grown rapidly following the 1992 drought, the proportion of panel households without cattle appears to remain remarkably persistent at a threshold figure of about 10%. Other data from the panel confirm that this same group is poor in many other respects as well.

Our analysis also raises issues relating to Zimbabwe's land reform and resettlement program. Specifically, it suggests that criticisms aimed at the alleged low productivity of the farming systems in resettled areas may be premature. It needs to be borne in mind that the farming systems planned for these areas hinge critically upon households' having a herd of the assumed size. What appears to have been forgotten by the critics of resettlement is that the program originally placed heavy emphasis on welfare objectives and that time would be required for poor families to create the necessary asset base. More than 90% of households in the panel now own

cattle, and the average herd size has more than doubled. It has however taken more than 12 years under the impact of repeated drought to achieve this. The outcome nevertheless has been the transformation of a group which was economically disadvantaged to one with a high degree of self-reliance.

Our findings based on the panel of 400 households from three resettlement schemes receive some corroboration from a recent review encompassing data from all resettlement schemes in Zimbabwe (Tawonezvi, 1995). Tawonezvi notes that, during 1985–91, the proportion of settlers owning cattle across all NRs increased from 71 to 86% and herds larger than five animals became more common. He remarks also however that, more than 10 years after resettlement, a significant proportion of families still have herds far smaller than they should have had at the start, an outcome attributed to the invalid planning assumption that settler households would possess five head of cattle upon resettlement.

Could communal area households also grow out of poverty following the route described here? The answer to this question is almost certainly a negative

one, at least for the majority. Many communal areas already experience extreme pressure on common grazing areas, both as livestock numbers return to pre-drought levels and as grazing land is more and more frequently diverted to cropping in response to human population pressures. Households in communal areas are moreover far more heterogeneous than their counterparts in resettlement areas. Inequities in livestock holdings and access to land mean that in many areas relatively small proportions of households dominate the use of both grazing and cropping land (see Moyo, 1995 for example). These disparities imply, of course, that communal area households tend to employ somewhat different strategies for coping with major shocks such as drought. With less-favorable entitlements, many communal area households rely heavily on resource-sharing networks and on rural-urban links manifested in remittances from close kin. Confronted with severely constrained sets of opportunities, large numbers of these households are simply unable to absorb repeated shocks such as the droughts of the 1990s without depleting critical components of their asset base.

NOTES

1. During 1980–95, 12 years—75% of growing seasons—experienced rainfall below the long-term national average. The seven consecutive harvest years 1989–95 were all affected by below average rainfall (See Figure 2).

2. See Agarwal (1990) for a review of the coping mechanisms employed by families in India and Corbett (1988) for a contrasting view of the African experience.

3. The villages cannot be described as nucleated since most planned village layouts provide no central place or public space, and residential plots are commonly laid out along ridge lines or access roads and tracks.

4. The male plowholder is now allowed to hold a nonagricultural job on the condition that the agricultural management of his plot remains satisfactory as judged by local extension and resettlement officials. Very few appear to have responded to the change in regulations by taking up a nonfarm job, but the severe contraction of the labor market that has accompanied structural adjustment means attractive jobs outside agriculture are now much harder to find.

5. The standard planned livestock holdings for resettlement areas in the three natural regions considered here are: NR II 7 cattle; NR III 11 cattle; and NR IV 16 cattle; it was assumed that it would take between five and 14 years after resettlement to attain these stocking levels (Cusworth, 1990). These planned numbers were also intended to be ceilings on herd sizes in each area, but no attempt to enforce limits on cattle numbers has ever been identified. Tawonezvi (1995) cites evidence which indicates that, depending upon area, between 8 and 20% of resettled

households had exceeded the target livestock numbers as early as 1990. There is likewise no evidence that any attempts have ever been made to enforce environmental or land-use regulations.

6. The official government critique of the program is best spelled out in Zimbabwe (1993b), while Moyo (1995) and Masilela and Weiner (1996) provide useful overall commentaries on the various perspectives that have labeled the program a failure.

7. The actual number of households surveyed in any given year ranges from about 385 to 430, depending upon resources available and the research theme for a particular year. Just over half the panel households reside in Mupfurdzi, about a quarter in Sengezi, and a fifth in Mutanda.

8. It is, of course, impossible to know to what extent the stated criteria were or were not applied. Undoubtedly some were given land because they had privileged access to the new state bureaucracy, even though the state apparatus of the early 1980s appeared less open to special interests than does that of the late 1990s. In addition, it is probable that the better-educated were more aware of the program and more able to cope with completing applications. There was certainly queue-jumping by squatters in some cases, but we have no evidence to indicate that squatters were generally more wealthy or powerful than others. Restrictions on off-farm employment were enforced in cases where the absence of a male head of household came to the attention of resettlement staff, and evictions took place for this reason but they were rare. Although resettled families were meant to relinquish the use of any land in the communal areas

from which they came, many retained a weak claim to their former plots by leaving behind a relative to cultivate them. This strategy was however intended to insure against the uncertain conditions of tenure in resettlement areas rather than to earn a farming income from two sources.

9. These figures for crops in the panel are reflected, albeit less dramatically, for livestock in the universe of resettlement schemes. During 1991–93, the average number of cattle on resettlement schemes dropped by 20% (Zimbabwe, 1993a).

10. Households may also sell maize to meet critical needs for cash even if the amount harvested is insufficient to meet consumption requirements.

11. In comparison, the average family in the panel retains in a normal season enough maize to provide each resident household member with 12.5 kg a month over a 12-month period.

12. The seed and fertilizer packs have become a political good and are often distributed with little regard for need. For example, preliminary results from the 1997 round indicate that some 84% of households in NRII received crops packs for the 1996–97 season despite the previous year's very good harvest. Local extension staff report that many of the poorest farmers simply convert the packs into cash by selling them to their neighbors.

13. Respondents confirmed that the reduction in the number of meals was in response to the shortage of food rather than due to time constraints arising from agricultural labor demands.

14. These figures contrast to some extent with the use of wild foods during the prolonged 1982–84 drought. In the earlier period, the proportion using wild foods in NRIV was very slightly higher, at 93%; that for NRIII was lower at 71%; but the proportion for NRII was almost 75%, more than double the 1992 figure.

15. A correlation between cattle ownership and consumption of wild foods is to be expected even in normal seasons. Herding cattle provides the herder with the time and opportunity to investigate ecological niches and terrain which would not ordinarily be explored, and these can be useful sources of wild plants and animals. It is common, for example, to see young children pausing to roast fieldmice or gather fruits or mushrooms while herding cattle. Indeed, it is suspected that near-universal primary education has led to a reduction in dietary diversity among young children who no longer herd cattle.

16. Some households receive food aid or income support every year because the Department of Social Welfare regularly provides these to the disabled and elderly. Drought relief, on the other hand, is normally triggered by the declaration of a local or national disaster.

17. The results in Tables 4 and 5 are not strictly comparable with those in Table 3 because the information comes from a different respondent and was elicited using a different format.

18. The fact that this item looms as large as it does in 1992 is because many women grew small quantities of hand-irrigated vegetables for sale. Hardly any field crops were sold. See Figure 3.

19. Gold-panning is illegal, and sporadic attempts have been made since the early 1980s to suppress it. Even though many officials tolerate panning in drought years, it is possible that its extent is understated by apprehensive respondents. Two virtues of panel studies however are that mutual trust is created between researchers and the communities in which they work and that responses can be checked for consistency across many years. Such checks indicate respondents have been remarkably forthright about gold-panning and other 'illegal' or doubtful activities.

20. The accounts are normally conventional, quick-access savings accounts held with the Post Office Savings Bank, building societies or banks.

21. The proportion of households in the panel selling livestock in order to raise money to buy food is about 50% greater than that recorded by Zindi and Stack for communal areas in the late 1980s and early 1990s (Zindi and Stack, 1992, p. 303).

22. We do not know the figures for cattle ownership at the time the households were resettled in 1980–82, but it is likely that the proportion of cattle-owners was less than the 58% observed in 1983. Preliminary results from the 1997 round of the panel study, which also surveyed some of the original communities from which the settlers came, indicate that the mean herd size in resettlement areas is more than double that of nearby communal areas. Or, phrased differently, mean communal area herd size in 1997 is comparable to mean resettlement area herd size in 1983.

23. Some idea of the heterogeneity in herd size may be gained from the herd sizes reported during the 1996 survey. By Natural Region, the mean herd sizes (with standard deviations in parentheses) were: NRII 9.93 (8.17), NRIII 9.20 (8.21), and NRIV 10.15 (10.46). See also note 5.

24. It is not yet known to what extent these outcomes reflect different strategies pursued by herd-owners in each group or simply bad luck. Analysis of the long-term dynamics of family herds is continuing.

25. This assertion is contradicted by the evidence of Figure 3, which suggests that retentions rise only in the immediate post-drought year and then return to a fairly uniform level in more normal years.

26. The ranking of the top two expenditure categories also corresponds with that found by Zindi and Stack (1992, p. 306) for livestock income in a survey of five communal areas in 1990–91. Their survey also ranks farm inputs and health expenditure in the same order but inserts another category—buying clothes—in third place.

27. It should be noted that Figure 8 distorts the value of family herds somewhat because each animal in the current herd is valued at the average sale price for all sales during the preceding year. Calves and heifers are seldom sold and,

when they are, sales are at prices that are low relative to those for cows or oxen.

28. Transhumance of cattle is an important drought-coping strategy at both national and local level in Zimbabwe. Cattle are regularly trucked long distances to areas where grazing is more plentiful, and cattle from the communal areas are often driven into adjoining resettlement areas which, until recently, were relatively underpopulated in terms of cattle numbers. Although caretaking of one or more animals for others is not uncommon, communal area cattle are not normally amalgamated into resettlement area herds and thus should not affect the size of the herds we are discussing which is based on ownership. Indeed, as more and more resettled farmers build up their herds to (and beyond) target levels, the intrusion of cattle from the communal areas to do "poach-grazing" has become a source of antagonism in some resettled areas. See Kinsey (1996) for further details.

29. This is the measure of herd size used heretofore in this paper.

30. An increase in the already high variability of herd sizes is also observed following the drought. At the height of the drought in 1992, the standard deviation in relation to

the mean number of cattle owned was 83%. The percentage grew steadily and stood at 92% in 1995.

31. The decline in cattle numbers counts all sales, slaughtering, deaths, losses and thefts but does not treat cattle transferred from the family herd as a decrease. The decline is also measured purely in decrements and takes no account of net changes in herd size due to births or acquisitions.

32. The exceptional case is farmers in the larger-herd group in NRIV. Their ratio of sales to total reductions increases consistently and nearly trebles during 1992-95. The reasons for this divergence are not clear but may relate to the fact that only NRIII experienced a significant decline in the number of households without cattle over this period. (See Table 11.)

33. Original planning assumptions called for a build-up to full herd size over a horizon stretching from five years for NRII to 14 years for NRs IV and V, assuming that the average settler possessed five head of cattle upon being resettled (Zimbabwe, 1992). This initial cattle endowment was a curious assumption to make for a program that originally targeted the needy; that most households have achieved or exceeded the target, despite repeated drought, is more to their credit than to that of the planners.

REFERENCES

- Agarwal, B. (1990) Social security and the family: Coping with seasonality and calamity in rural India. *Journal of Peasant Studies* 17(3), 341-412.
- Besley, T. (1995) Savings, credit and insurance. In *Handbook of Development Economics*, Vol. 3a, ed. J. Behrman and T. N. Srinivasan, pp. 2123-2207. Elsevier, Amsterdam.
- Corbett, J. (1988) Famine and household coping strategies. *World Development* 16(9), 1099-1112.
- Corbett, J. (1994) Livelihoods, food security and nutrition in a drought prone part of Zimbabwe. Centre for the Study of African Economies, University of Oxford, Oxford.
- Coudere, H. and Marijsse, S. (1988) 'Rich' and 'poor' in Mutoko Communal Area. *Zimbabwe Journal of Economics* 2(1), 1-25.
- Cusworth, J. (1990) Land resettlement issues. Background paper prepared for the World Bank Zimbabwe Agricultural Sector Memorandum. The World Bank, Washington, DC.
- Deaton, A. (1990) Saving in developing countries: Theory and review. *World Bank Economic Review*, Special Issue, Proceedings of the first Annual World Bank Conference on Development Economics, pp. 61-96, The World Bank, Washington DC.
- Deaton, A. (1997) *The Analysis of Household Surveys: A Microeconomic Approach*. Johns Hopkins University Press, Baltimore, MD.
- Dercon, S. (1992) The role of assets in coping with household income fluctuations. Centre for the Study of African Economies, University of Oxford, Oxford.
- Eilerts, G. S. (1994) An assessment of vulnerability in Zimbabwe's Communal Lands. United States Agency for International Development, Famine Early Warning System Project, Harare.
- GFA (1987) Study on the economic and social determinants of livestock production in the communal areas, Zimbabwe. Department of Veterinary Services, Harare.
- Gillespie, S. (1993) A review of nutrition surveillance in Zimbabwe. Ministry of Health and Child Welfare, National Nutrition Unit, Harare.
- Herald* (various issues)
- Hicks, D. (1993) An evaluation of the Zimbabwe draught relief programme, 1992/93: The roles of household level response and decentralized decision making. World Food Program, Harare.
- Jackson, J. C. and Collier, P. (1991) Incomes, poverty and food security in the communal lands of Zimbabwe. In *Rural Development and Planning in Zimbabwe*, ed. N. D. Mutizwa-Mangiza and A. H. J. Helmsing, pp. 21-69. Avebury, Aldershot.
- Kinsey, B. H. (1996) Community control, land use and sustainability: Administering agricultural land tenure reform in Zimbabwe. Paper presented at the International Conference on Land Tenure and Administration, The University of Florida, Orlando, Florida, November.
- Kinsey, B. H. (forthcoming) Dancing with El Niño: Drought, the state and the nutritional welfare of rural children in Zimbabwe. In *A World without Famine*, ed. Helen O'Neill and John Toye. Macmillan, London.
- Masilela, C. and Weiner, D. (1996) Resettlement planning in Zimbabwe and South Africa's rural land reform discourse. *Third World Planning Review* 18(1), 23-43.
- Moyo, S. (1995) *The Land Question in Zimbabwe*. SAPES Books, Harare.

- Newbery, D. M.G. and Stiglitz, J. E. (1981) *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*. Oxford University Press (Clarendon), Oxford.
- Paxson, C. H. (1992) Using weather variability to estimate the response of savings to transitory income in Thailand. *American Economic Review* **82**, 15-33.
- Scoones, I. (1996) *Hazards and Opportunities. Farming Livelihoods in Dryland Africa: Lessons from Zimbabwe*. Zed Books Ltd., London.
- Tagwireyi, J. and Greiner, T. (1994) *Nutrition in Zimbabwe: An Update*. The World Bank, Washington, DC.
- Tawonezvi, H. P. R. (1995) Status of livestock in resettlement schemes in Zimbabwe. Friedrich-Ebert Stiftung, Harare.
- Zimbabwe (1992) Second report of settler households in normal intensive Model A resettlement schemes. Socio-economic survey 1988/89 and 1989/90: Main report. Ministry of Lands, Agriculture and Rural Resettlement, Planning and Research Section, Monitoring and Evaluation Unit, Harare.
- Zimbabwe (1993a) Agricultural Production on Resettlement Schemes, 1993. Central Statistical Office, Harare.
- Zimbabwe (1993b) Value for Money Project (Special Report) of the Comptroller and Auditor-General on the Land Acquisition and Resettlement Programme. Office of the Comptroller and Auditor-General, Harare.
- Zimbabwe (1995) Inequality among Households in Zimbabwe: An Assessment using the 1990/91 Income, Consumption and Expenditure Survey. Central Statistical Office, Harare.
- Zindi, C. and Stack, J. (1992) Income versus insurance: Preliminary findings on the contribution of livestock to communal area farm household food security. In *Food Security Research in Southern Africa: Policy Implications*, ed. J. B. Wyckoff and M. Rukuni, pp. 293-316. University of Zimbabwe, Department of Agricultural Economics and Extension, Harare.