DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

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Small Grain Export Potential
and Government Objectives in Zimbabwe
A Mean-ends Inconsistency?

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I. INTRODUCTION

The potential for Zimbabwe to develop viable small grain[1] export markets within the SADCC region will depend crucially on:

1.   Zimbabwe's ability to produce reliable marketed sorghum and millet surpluses at a cost low enough to ne competitive with C.I.F. import prices of coarse grains in other SADCC countries: and

2.   the development of reliable and effective import demand for small grains among other SADCC countries.

Inherent within conditions (1) are questions related to the incidence of response to increased small grain production incentives, the strong random influence of weather as a determinant of small grain export supplies, transport constraints and other marketing problems. Within conditions (2) are issued concerning the reliability of weather-induced import demand within the region, the enthusiasm of donors to finance triangular transactions over the long run, and the scope for other SADCC countries to translate their stated food self-sufficiency goal in reality. This paper examines the potential for these two fundamental conditions to be met, and more broadly considers whether their achievement would actually be consistent with Zimbabwe's agricultural policy objectives.

Before discussing these issues formally, we consider the context and rationale for considering small grain export potential from Zimbabwe's standpoint. Shortly after independence in 1980, the Government of Zimbabwe committed itself to improving the productivity and income of smallholders. However, it became evident that the Zimbabwean "maize revolution" -- the tripling of communal sector grain production and the tenfold increase in communal sector sales to the Grain Marketing Board (GMB) between 1980 and 1985 -- had largely bypassed Zimbabwe's drier communal area (Rohrbach, 1989; Amin, 1988). To redress this situation, the Government in 1984 adopted an income policy for dryland areas using small grain marketing and pricing policy as instruments. In 1984, bulrush and finger millet -- crops agronomically suited to semi-arid areas -- were declared controlled crops. Sorghum and millet price were set at levels to encourage expanded production in the nation's dryland areas. The network of

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[1]Small grains are normally defined to consist of red and white sorghum, mhunga (bulrush millet) and rapoko (finger millet).

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GMB buying points was expanded considerably in low-rainfall regions.

A half-decade later, the government is still trying to cope with the costly consequences of this strategy. While successful in stimulating small grain deliveries to the GMB -- though primarily from the commercial sector -- strategies to concomitantly stimulate small grain demand were lacking. As a result, government sorghum and millet stocks had risen to unprecedented levels,[2] requiring huge price discounts in order to dispose of rapidly deteriorating stocks. In this glut situation, producer prices of these crops have been allowed to decline with inflation over the past five years. In addition millet and red sorghum have been partially decontrolled, and the extensive GMB collection point system established in 1985 has been sharply curtailed. Relatively few GMB facilities remain in the nation's semi-arid regions.

The lesson learned from this experience is that small grain utilization problems are perhaps the biggest constraints on increased small grain production. In this context, exploring opportunities to create new markets for small grain disposal, among them export markets, assume particular importance. However, the ability to create such markets (conditions 1 and 2 above) would not necessarily mean that it would be desirable for government to do so. The viability of investing in small grain export capacity is a function of the government's objectives in relation to its small grain policy. We assume from various policy pronouncements that the government primarily seeks through its small grains policy to promote income growth and food security for the three million smallholders living in semi-arid areas in Zimbabwe, and to efficiently generate foreign exchange revenue (Takavarasha, 1990). Under these assumptions, it is unclear whether conditions (1) and (2) above -- even if they could be achieved -- would appreciably promote either income growth in dryland areas or the efficient generation of foreign exchange.

The remainder of the paper develops the arguments leading to this conclusion. Section 2 considers Zimbabwe's ability to produce a reliable exportation small grain surplus, and the potential beneficiaries of small grain marketing and price incentives necessary to induce such an exportation surplus. Section 3 and 4 examine the potential magnitude and reliability of import demand within the SADCC region. Conclusions and policy implications are discussed in section 5. In particular, we suggest the existence of a means-ends inconsistency between a policy of deliberate

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[2] For example, in 1987, GMB sorghum stocks were four times higher than annual domestic sales. Bulrush and finger millet stocks stood at 34 and 36 times the level of annual domestic sales, respectively (Mbwanda and Rohrbach, 1989)

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investment in small grain export capacity and the goals of income growth among dryland smallholders and efficient foreign exchange generation.

II.   PRODUCTION AND SUPPLY CONSTRAINTS

2.1 Exportation Surplus Potential

The recent experience of massive small grain stocks has tended to obscure the fact that Zimbabwe farmers failed four times since 1980 to produce and sell enough sorghum to the government to meet commercial domestic demand (Figure 1). While the reasons for this include deliberate marketing policy disincentives these include the withdrawal of GMB collection points from many semi-arid communal areas and lower real producer prices (1987) as well as drought (1980, 1982, 1983), it is clear that sorghum intake during the 1980s has not been consistently high enough to generate a reliable exportation surplus. The three years of clear surplus (1981, 1985 and 1986) were all due to a combination of abnormally good rainfall and /or a proliferation of GMB buying points. In all three years, the deliveries came primarily from commercial farming areas.

These facts should not be construed to mean that Zimbabwe cannot produce a consistently reliable small grains surplus, for it surely can -- given sufficient government resources and commitment. Such a commitment may fall into one of the possible categories: (1) investments in improved production and processing technology: (2) price policy; and (2) improved market infrastructure. While option (1) probably provides the greatest potential in the long run, this analysis confines itself to measure (2) and (3) which are feasible within the short and medium run.

Price Policy:

A strategy of attempting to enhance incomes and food security for smallholders in semi-arid areas through producer price incentives for small grains would be ineffective and perhaps counterproductive. This is clear from examining the skewed nature of marketed grain surplus in Zimbabwe. Between 1984 and 1989, 45 percent of all GMB sorghum intake came from three GMB depots in the commercial farming areas (Figure 2). Within the communal areas, GMB intake is also highly skewed, owing to the significant variation in productive potential among smallholders. Intake of mhunga and rapoko -- crops grown predominantly within the communal areas -- came mainly from several high potential areas in NR II and III (Figures 3 and 4). In fact, available evidence over the past few years suggests that most smallholders in Natural Regions IV and V, representing about 60 percent of Zimbabwe's communal sector population, sell little or no grain at all (Rohrbach, 1989; Chigume and Jayne, forthcoming; Hedden-Dunkhorst, 1989). Many are in fact dependent on the market to buy grain or grain meal because they do not produce enough to meet their own family requirements.

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Figure 1:
Offical Sorghum Intake and Exportable Surplus: Zimbabwe, 1970-1987

Rohrbach, 1989
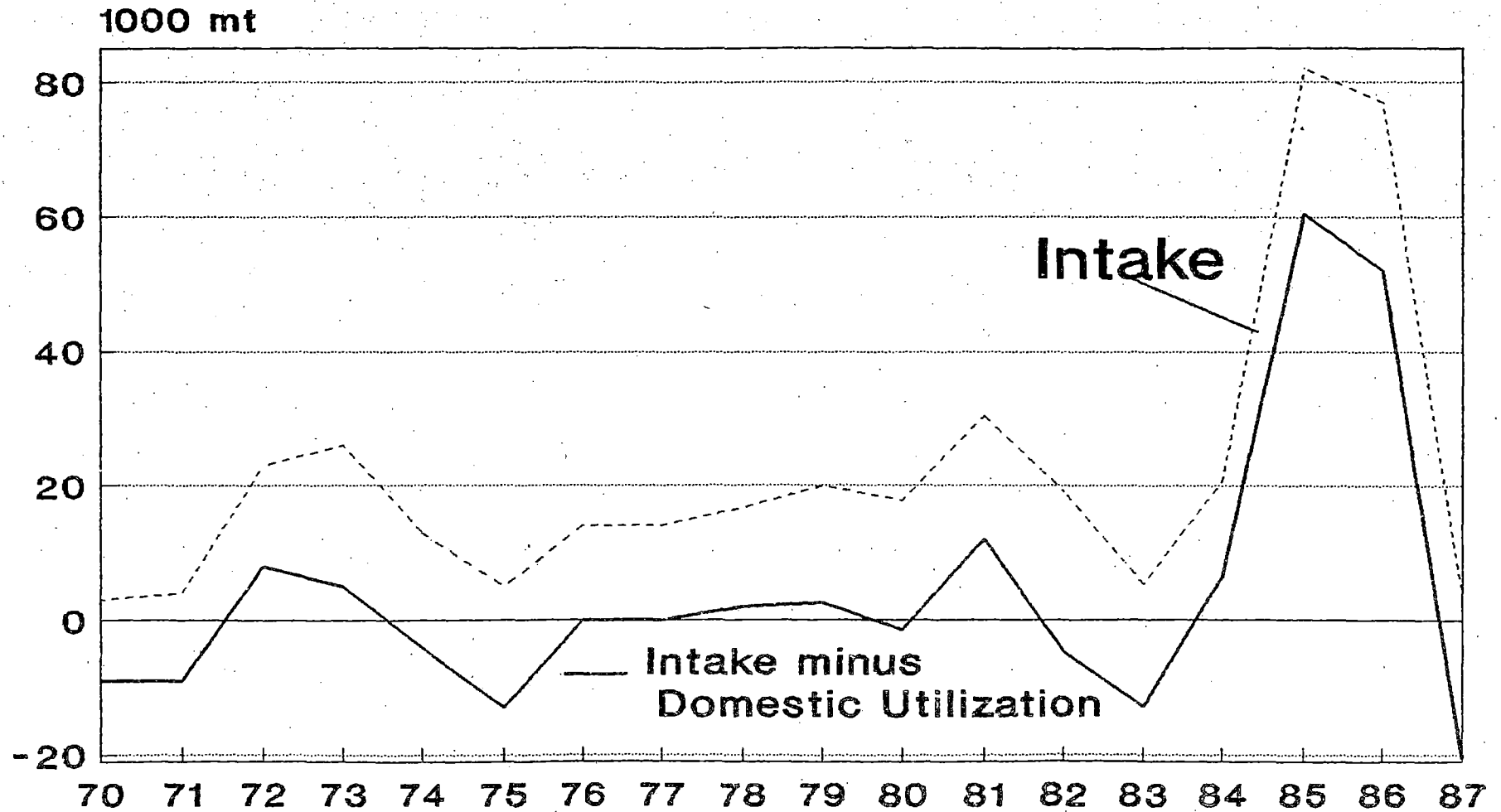
FIGURE 2: SORGHUM DELIVERIES TO MAJOR DEPOTS
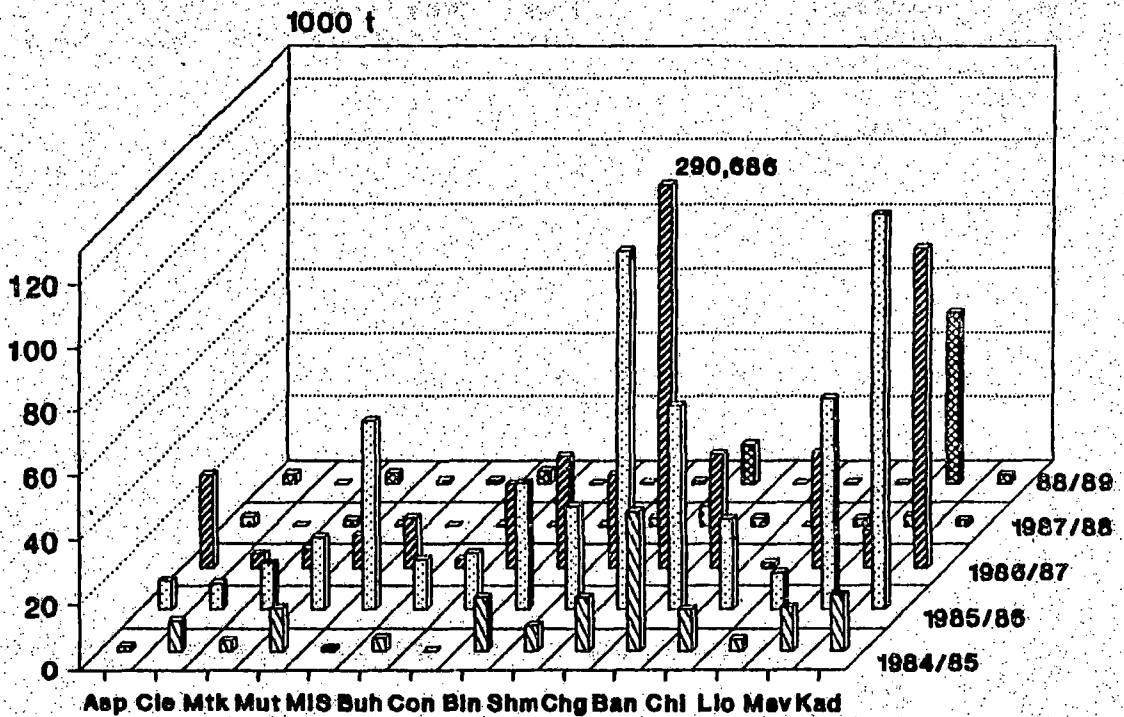
GMB Depot Codes

Aps:	Aspindale	Chg:	Chegutu	Buh:	Buhera
Cle:	Cleveland Dam	Ban:	Banket	Shm:	Shamva
Mtk:	Mutoko	Msv:	Masvingo	Kad:	Kadoma
Mut:	Mutare	Chi:	Chinhoyi	Mis:	Middle Sabi
Lio:	Lions Den				

Source: GMB Files

FIGURE 4: RAPOKO DELIVERIES TO GMB DEPOTS
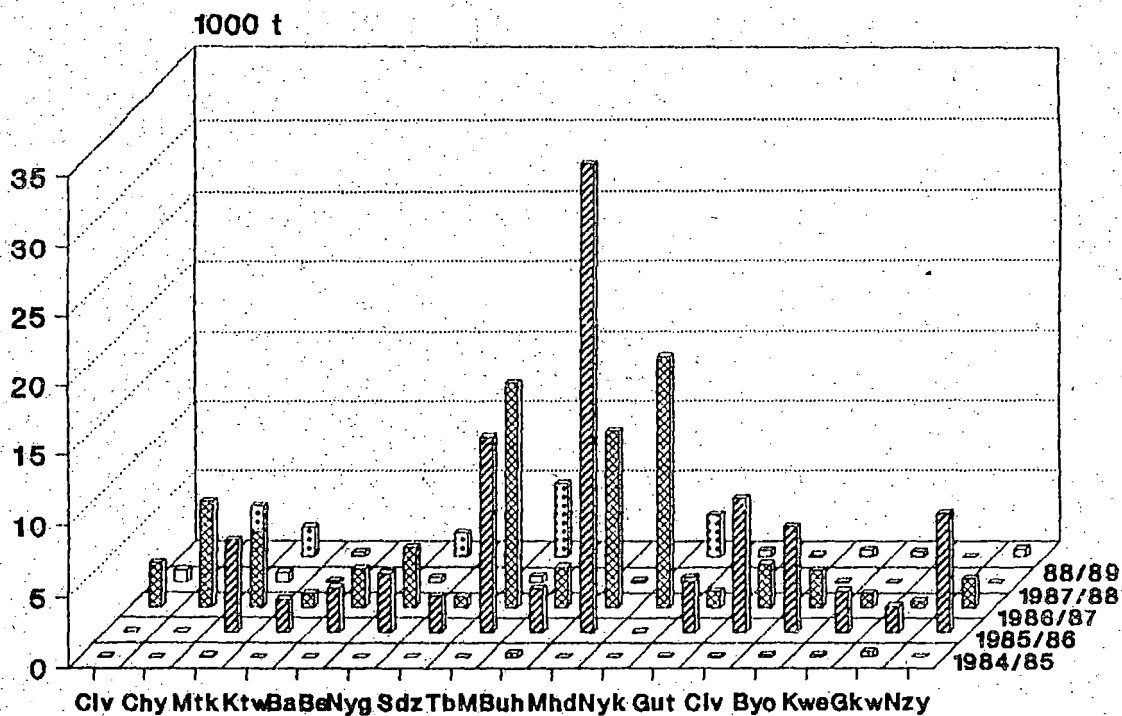
GMB Depot Codes

Cle:	Cleveland Dam	Chy:	Chinyudze	Mtk:	Mutoko
Ktw:	Kotwa	Nyg:	Nyanga	Bab:	Bazeley Bridge
Sdz:	Sadza	Tbm:	Timbermills	Buh:	Buhere
Mhd:	Mhondoro	Nyk:	Nkayi	Gut:	Gutu
Civ:	Chivu	Byo:	Bulawayo	Kwe:	Kwe Kwe
Gke:	Gokwe	Nzy:	Nembudziya		

Source: GMB Files

FIGURE 3: BULRUSH MILLET DELIVERIES TO GMB DEPOTS
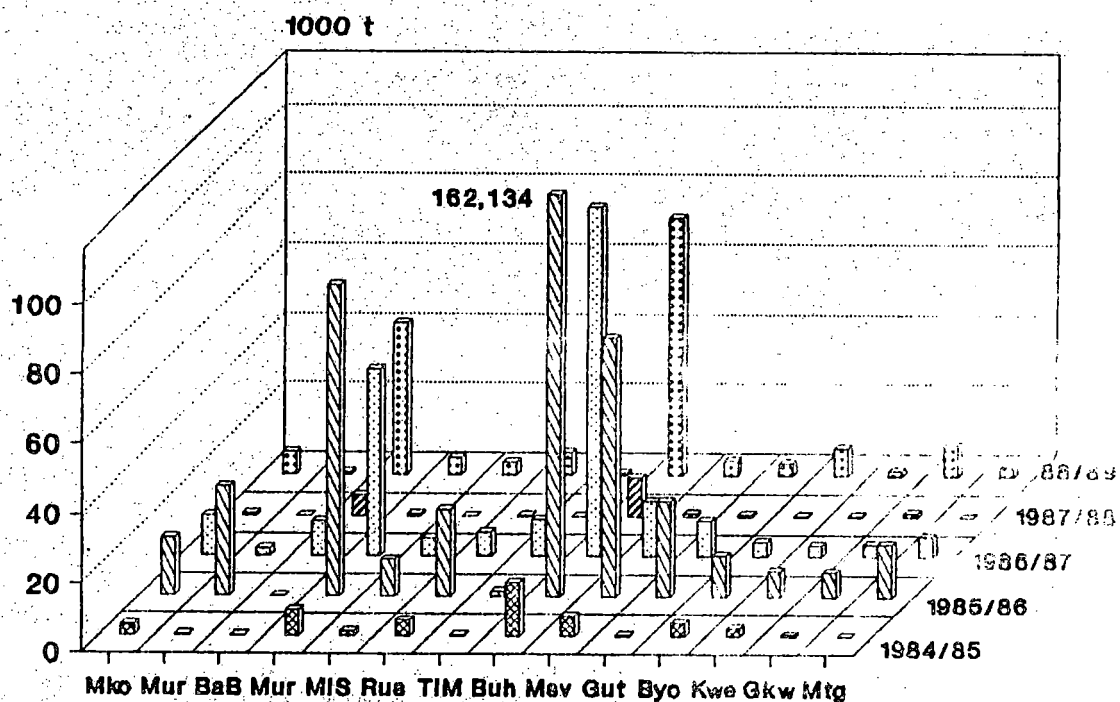
GMB Depot Codes

Mtk:	Mutoko	Mur:	Murewa	Bab:	Bazeley Bridge
Mut:	Mutare	Rus:	Rusape	Tim:	Timbermills
Buh:	Buhere	Msv:	Masvingo	Gut:	Gutu
Byo:	Bulawayo	Kwe:	Kwe kwe	Mis:	Middle Sabi
Lio:	Lions Den				

Source: GMB Files

A higher GMB producer price may rechannel grain sold by a minority of surplus producers from local communal area markets to the GMB, thus raising informal acquisition prices in semi-arid communal area and impeding access to grain by deficit households.[3]   These results suggest that under current market arrangements, price policy designed to generate an exportable small grain surplus will have very concentrated benefits and potentially adverse effects on grain-deficit smallholders.

Market Infrastructure and Regulation:

Selective improvements in market access may be a vehicle to generate an exportable surplus in the process of channelling benefits to a specific strata of the population. For example, the development of GMB collection points or processing facilities in low-rainfall communal areas may induce greater small grain deliveries from these areas. Alternatively, quotas could be set on commercial sector deliveries in order to increase the proportion of intake from the communal areas and thus the benefits of GMB market access. However, both of these schemes suffer from the fact that they may extract grain out of local informal markets to the detriment of food insecure households who lack the resources to raise production even if the incentives to do so were significantly increased. In addition, these schemes would tend to shift the geographical composition of production and sales from stable surplus-production areas to relatively unstable, drought-affected areas where the GMB has tended to operate at a substantial financial loss, as recent experience has shown.

Apart from whether Zimbabwe could generate a reliable exportable surplus of small grains, it is not clear that this would represent the most-effective use of scarce resources, especially given the potential that other crops, such as cotton, sunflower and groundnut, among others, may promote income growth among semi-arid smallholders and generate foreign exchange more efficiently than small grains. These issues, subsumed in the general evaluation of comparative advantage of small grains in Zimbabwe, are currently being analyzed by Masters (forthcoming). The important point here is that given historical levels of government resources primarily prices and marketing infrastructures devoted to small grains, a

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[3]While we have considered only the direct effects of a higher price of grain on income distribution, there are potential secondary effects which deserve greater attention. For example, a higher price may stimulate acreage expansion among relatively well-endowed farmers, eliciting on employment effect that could conceivably promote incomes among the poor. However, preliminary evidence in Mutoko and Buhera communal areas suggests that this secondary effect is relatively weak (chigume and Jayne, forthcoming).

consistently reliable small grains surplus cannot be assured.

2.2 Reliability of Exportable Surplus

Zimbabwe's potential to develop durable small grain export markets depends not only on stimulating the average level of supply relative to domestic utilization, but on increasing the stability of that supply. Exportable surplus (ES), i.e., the surplus available after domestic utilization to be wither stored or exported, is identically equal to domestic deliveries to the GMB (DD) minus domestic sales (DS), representing primarily the demand of stockfeeders millers and brewers. By taking the variance of be decomposed into the following terms:

(1) VAR (ES) = VAR (DD) - VAR (DS) -2*COV (DD< DS)

Using data in Mbwanda and Rohrbach (1988) over the 1975-89 period, it is clear that the overwhelming proportion variation in exportable surplus, 112 percent, was associated with variations in domestic GMB deliveries.[4] Variation in domestic sales was associated with only 14.2 percent of the total variation in exportable surplus. This makes it clear that efforts to develop a reliable exportation surplus must focus on stabilizing GMB intake from commercial and communal producers.

The reliability of GMB intake is a function of the proportion of small grain area cultivated in the various natural regions. This is because the stability of production and intake tend to vary widely between natural regions and relatedly, between commercial and communal farming areas. One indicator of the relative magnitude of instability among data series is the standard deviation of annual percentage changes. This indicator measures the expected percentage change in production from one year to the next.[5]

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[4]The fact that this figure is over 100 percent is because the covariance between domestic deliveries and sales is negative. This is because as production and deliveries are low, more tends to be demanded from the GMB by stockfeeders and other consumers to make up for the shortfall, and vice versa. This phenomenon has also been noted by Blackie (1984) and Lele and Candler (1984).

[5]This holds if the variable in question approximates a normal distribution, an assumption which is supported by an assessment of the data over both the 1975-1989 and the 1980-1989 periods. Further properties of this indicator are that (1) it implicitly accounts for any trend components in the data, and (2) it is a measure of relative rather than absolute variability and thus accounts for the fact that sorghum production in the communal lands is higher than in commercial farming areas.

The results indicate that small grain production and intake since 1975 have been substantially more unstable from the communal sector than from the commercial sector (Table 1). The expected absolute percentage change in GMB intake was over 140 percent from the communal sector and about 115 percent from the commercial sector. The relatively high degree of instability within the communal lands is partly weather-induced; this source of instability, which becomes more severe as one moves into the low-rainfall areas, accounts for the single largest source of communal area production instability for both sorghum, mhunga and maize (table 2).[6] The greater the share of production in drier areas -- where the intended beneficiaries of government small grains policy live -- the more variable the intake, and the greater the risk of having nothing to export.

While the magnitude of supply instability is currently extremely high, the preceding analysis indicates that national GMB intake may be subject to even greater variability as more land is shifted from higher potential zones to relatively semi-arid communal lands that are more prone to drought. The higher variability of sales from the communal sector is also due to different strategies for growing grains between the two sectors. In the commercial sector, coarse grains are primarily cash crops and therefore almost all the grain produced is sold to the GMB. In the communal sector however, households grow grain primarily for household usage, and would attempt to maintain their consumption level during a drought year be selling less. If, for example, 80 percent of production is for subsistence, then a 10 percent decline in production would lead to a 50 percent decline in sales (i.e., from the 20 percent of production that is marketed). For this reason, variability in Zimbabwe's exportable small grain surplus is significantly higher than the variability in small grain production.

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[6]See Appendix 1 concerning how production variability is decomposed into area and yield components.

Table 1

Standard Deviation in Annual Percentage Changes in Grain Production and Intake (1975-1989)

| | STD of annual % change in | |
	Production (000 mt)	GMB intake (000 mt)
COMMUNAL:		
SORGHUM	104	144
MHUNGA	107	---
MAIZE	53	102
COMMERCIAL		
SORGHUM	69	114
MAIZE	41	56

Table 2

Sources of Production Instability in Communal and Commercial Grain Production

| | % of variance in production from: | | |
	variance (AREA)	variance (YIELD)	covariance (AREA,YIELD)
COMMUNAL:			
SORGHUM	11	70	19
MHUNGA	24	39	37
MAIZE	5	67	28
COMMERCIAL:			
SORGHUM	38	31	34

Source: Food Security Database, UZ

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2.3 Relationship between Supply Instability in Zimbabwe and Potential SADCC Importers.

The foregoing analysis suggests that Zimbabwe's current ability to produce an exportable small grain surplus is greatly affected by supply instability, which is in turn largely weather-influenced. The degree to which such fluctuation are correlated with production and import demand in neighboring SADCC states will critically effect the development of small grain trade within the region.

The higher the risk that Zimbabwe would have nothing to export when other countries need grain, the higher the probability that self-sufficiency policies will be pursued elsewhere in the region, thus drying up the potential for viable long run trading opportunities. To the extent that weather affects production among SADCC countries in a similar way (positive correlation), the more likely that high import demand in other countries will coincide with lower export potential in Zimbabwe. However, if production in Zimbabwe fluctuates inversely with production in neighboring countries (negative correlation), the more likely that high import demand in other countries will coincide with large exportable surpluses in Zimbabwe. Table 3 presents correlation coefficients for sorghum production among seven SADCC states, highly so in the case of Zambia and Botswana, two potential small grain importers. This result dampens, but in no way precludes, the development of small grain export potential in Zimbabwe.

One important qualifier to the above is that an export niche for specific types of sorghum may be developed at fairly low cost. For example, High-quality red malting sorghum may be consistently demanded irrespective of the weather, by foreign commercial brewers within the SADCC region. Moreover, commercial millers have indicated that they represent a ready market for high quality white sorghum if the grains could be sorted during the marketing process according to grain kernel size and sold accordingly. This would require more rigorous grading and standardizing procedures at the GMB, but could bring high payoffs in terms of capturing what appears to ne an unmet demand for high-quality sorghum. Demand by foreign commercial millers and brewers, apparently driven more by quality standards rather than domestic production shortfalls, would be less affected by weather fluctuations. The major limitation here is that the volume of demand would nevertheless be quite small.

Table 3

Correlation Coefficients of Sorghum Production between
Zimbabwe and other SADCC Countries: 1970-1986

	Zimbabwe
BOTSWANA	.52
ZAMBIA	.49
TANZANIA	.39
MALAWI	.22
MOCAMBIQUE	.21
LESOTHO	.06

Source: Technosynesis and FAO Production, Yearbooks, various
           years.

Three conclusions may be drawn from the discussion thus far.
First, Zimbabwean small grain production is highly variable and
positively correlated with production fluctuations in other SADCC
states.   This increases the risks of investing in surplus small
grain production, since in a good rainfall year throughout the
region, Zimbabwe may find itself with a large exportable surplus
and few external markets in which to dispose of it.   Second, the
high variability of sorghum and millet intake means that the GMB
may have little to export in excess of domestic requirements during
drought years.   Despite high stocks in recent years, Zimbabwe has
not been able to produce a consistent small grain surplus since
1970.   A greater allocation of government resources will be
necessary to appreciably stimulate the level of surplus required to
make Zimbabwe a reliable exporter.   Third, the ability for Zimbabwe
to produce a consistent exportable surplus will depend crucially on
the proportion of small grain cultivation in the higher potential
areas, especially in Natural Regions II and III.   Unfortunately,
this presents something of a means-ends inconsistency.   Enhancing
the incentives for small grain production and marketing in the high
potential areas appears to be necessary for viable trade potential,
but these incentives would be captured primarily by people other
than the intended beneficiaries of the government's small grain
policy.   Improved technology appropriate for low-rainfall areas
appears to be necessary before the link between small grain trade
and enhanced incomes for communal farmers in semi-arid areas can be
established.

III.   IMPORT DEMAND CONSTRAINTS

Given the thinness of the world market for small grains, coupled
with the high bridging costs of exporting grain from landlocked
Zimbabwe to world markets, the scope for commercial small grain
exports appears to be limited primarily to neighboring SADCC
markets. This theoretical limitation has been born out by reality:
since 1970, Zimbabwe is commercially exported less than 20,000
tonnes of sorghum, primarily to it SADCC neighbors (Mbwanda and
Rohrbach, 1989). Hence, to state with, Zimbabwe's potential
commercial clients will comprise a narrow range of countries.

A prerequisite for "potential" is a deficit in one or more of these
countries for which effective demand exists. Zimbabwe's purpose
for developing a small grains exportable surplus is of course not
to present gifts. A major intention, we presume, is to earn
foreign currency. However, with the exception of Botswana,
Zimbabwe's potential SADCC trading partners suffer from severe
foreign exchange constraints and non-convertible currencies.
Triangular transaction arrangements could offer a solution to this
problem, from the standpoint of both Zimbabwe and its grain deficit
neighbors, but small trade built on this foundation would be
dependent on continued donor largess. At least in the short and
medium-run, foreign currency shortage will constraints effective
demand in the SADCC region for all grains.

Since most of the neighboring countries will prefer to offer non-
convertible currencies, it may be in Zimbabwe's interest to explore
whether mutually beneficial barter trade could be developed
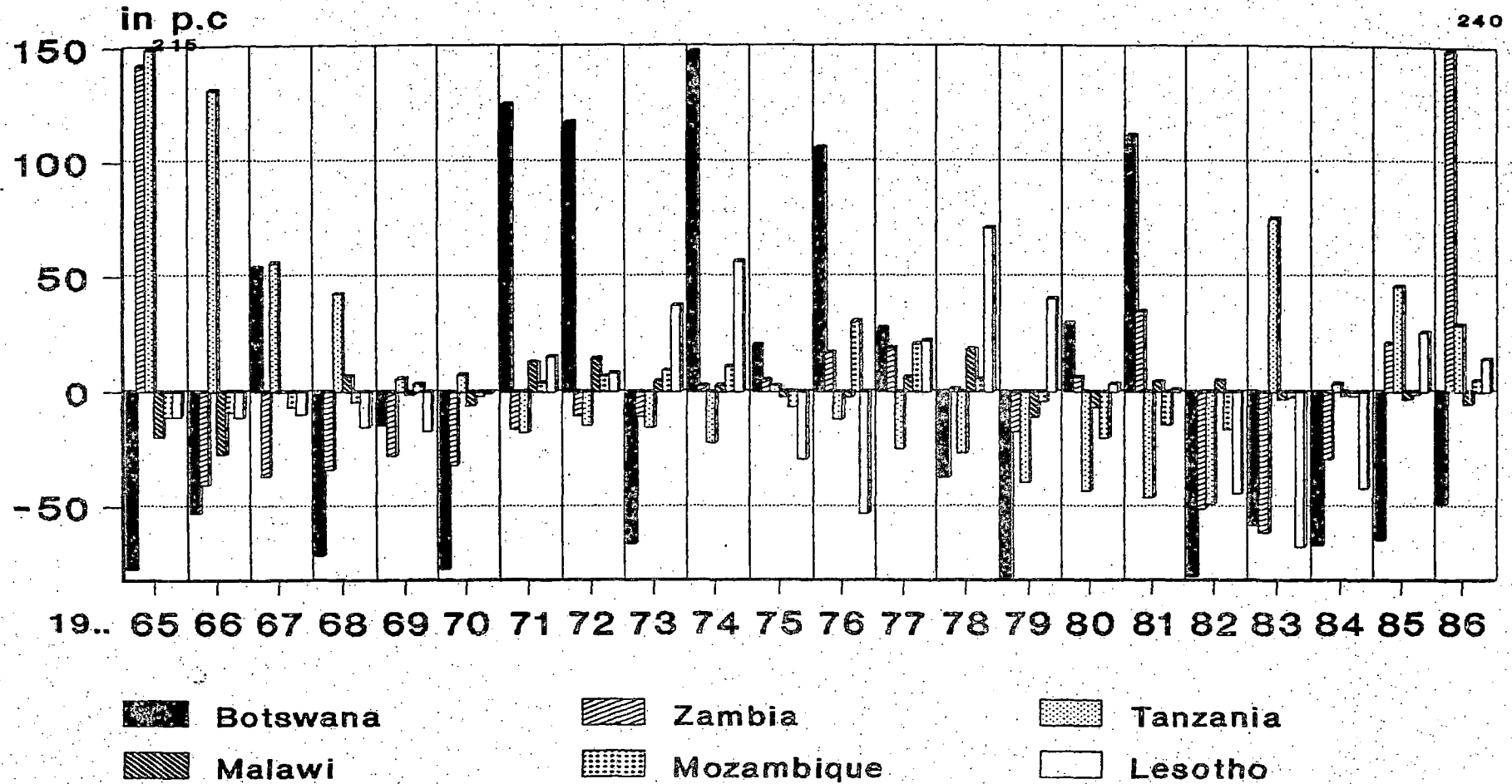involving small grain export.

As mentioned above, the greatest potential for a durable effective
demand for small grain may come from the commercial brewing
industries within the region. High-quality sorghum with desirable
malting characteristics may fetch an attractive price, but demand
is fairly limited. Demand for sorghum as a livestock feed is
constrained by relatively low per capita incomes in the region
needed to fuel commercial livestock consumption, and by price
policies that make maize relatively cheap compared with small
grains.

An evaluation of the potential for Zimbabwean small grain exports
must distinguish between three types of potential importers: (1)
those countries with a trade potential based on structural deficits
and effective demand; (2) those countries with structural deficits
but low effective demand; and (3) those countries approaching self-
sufficiency and sporadically entering the market as importer only
when rainfall is poor. Although countries fitting under the first
category offer the most promise for the development of durable
trade links, dew countries in the SADCC region fit this
description. Botswana may most nearly fit category (1), yet

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Zimbabwe will continue to face stiff competition from the republic
of South Africa (RSA) to supply this market. The RSA's continued
willingness to heavily subsidise its grain exports will greatly
affect the size of Zimbabwe's future grain export market in the
region. It is apparent from the dearth of small grain trade within
the entire SADCC region that most countries most nearly fit into
categories (2) and (3). The degree to which millet and sorghum
production fluctuates among Zimbabwe's potential trading partners
(Figures 5 and 6) indicates a highly uncertain and variable export
market.

Figure 5: Relative Deviation from Trend in
Sorghum Production of SADCC-countries

Legend:
- Botswana
- Malawi
- Zambia
- Mozambique
- Tanzania
- Lesotho

Technosynesis and FAO-data

Figure 6 Relative Deviation from Trend in
Millet Production of SADCC-countries

In p.c

150

100

50

0

-50

-100

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86

■ Botswana   ▨ Zambia   ▥ Tanzania

14 b

Technosynesis and FAO-data
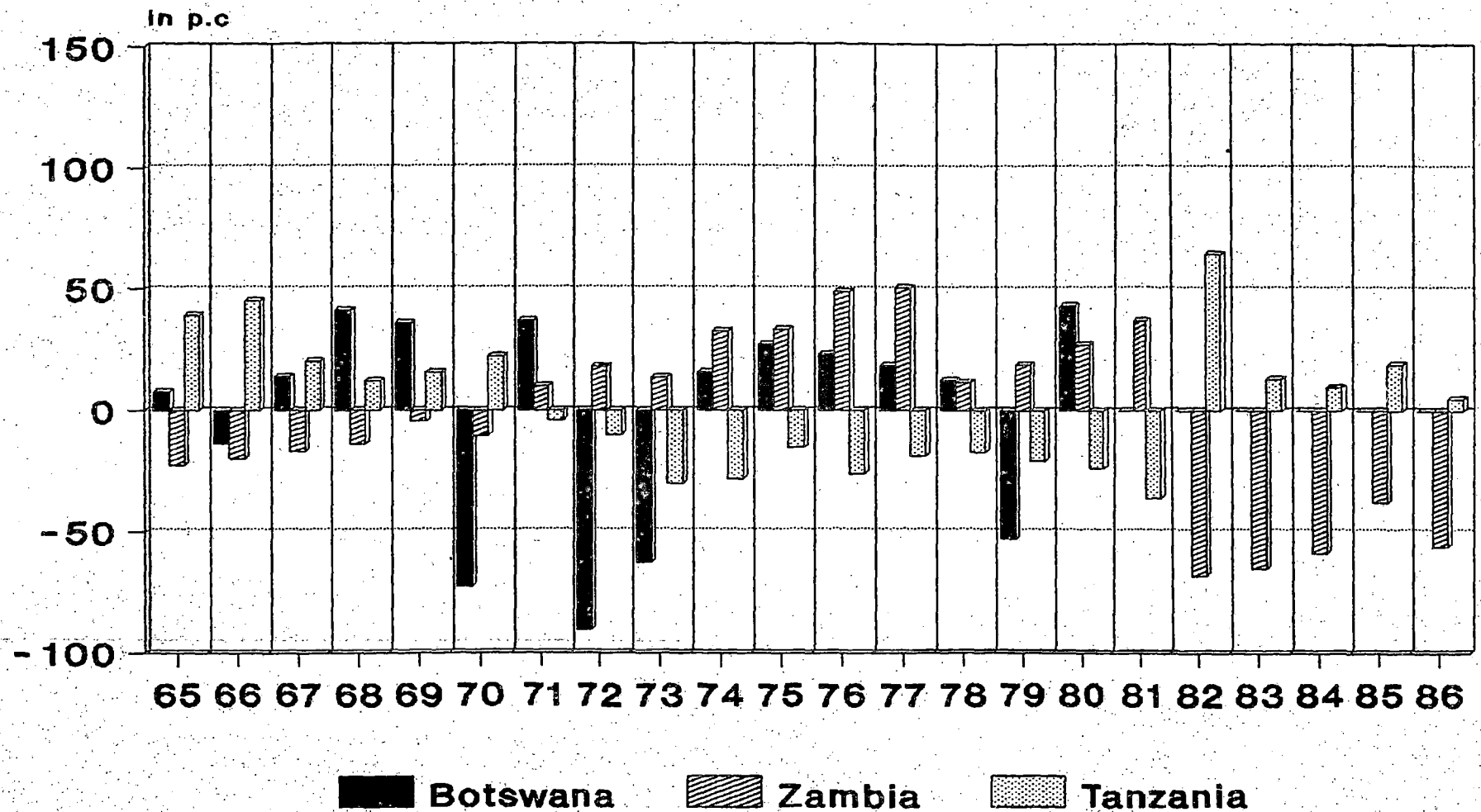
IV. EXPORT MARKETING CONSTRAINTS

In an environment of deteriorating transport capacity within the SADCC region, the logistics of exploiting trade opportunities become more difficult, especially for relatively high-volume/low-value commodities such as sorghum and millet. The competitiveness of Zimbabwe's small grain exports in relation to exports from foreign suppliers is presented in Figure 7 and 8. From the standpoint of Malawi, for example, it would not have been economically viable to import sorghum from Zimbabwe under commercial terms at any time since 1980, since it could have been acquired at lower cost from the would market. A similar observation held for all import markets requiring ocean freight, such as Somalia or Ethiopia (Figure 8). The contribution of transport constraints to Zimbabwe's status as a high-cost supplier is illustrated by the fact during most years since 1980, it was less costly to move a tonne of grain to Llilongwe, Malawi from the US Gulf than to transport it overland from nearby Harare. This suggests that apart from subsidised sales or triangular transactions, Zimbabwe's small grain export niche is very narrow.

Export agencies for any commodity need to know the type of agency that will be their customer in other countries, specifically the small grain quality characteristics sought by various potential buyers. In Zambia, for example, local producers and traders distribute grain through well established and sometimes elaborate distribute grain through well established and sometimes elaborate market networks. Local traders are well aware of the timing of disposal on their markets and the quality characteristics that are preferred ny industrial and non-industrial consumers. As mentioned above, opaque beer producers prefer sorghum varieties with specific malting characteristics. A small grain export strategy in Zimbabwe that estimates potential demand for these specific niches and then attempts to produce the desired varieties may more successfully develop a durable, consistent regional small grain trade than a strategy that looks at neighboring countries as places to vent sporadic surpluses during years of good whether and/or high stocks.

A selective targeting strategy based on consumption preference in other countries would also be more impervious to the unpredictable impact of food aid injections into the SADCC region. For example, food aid organization dealing with famine relief, while necessary to reduce hunger, may present major dislocation in the grain economy of regional surplus producers such as Zimbabwe. It is certainly not inconceivable that future commercial sales of Zimbabwean small grains are crowded out by subsidised or free grain from donor countries suffering from excess supply problems. In such an environment, deliberations regarding a long-run small grain export policy in Zimbabwe may strongly benefit from consideration of the potential impacts of the political economy of international grain markets.

FIGURE 7:   SORGHUM IMPORT PRICES AT MALAWI BORDER
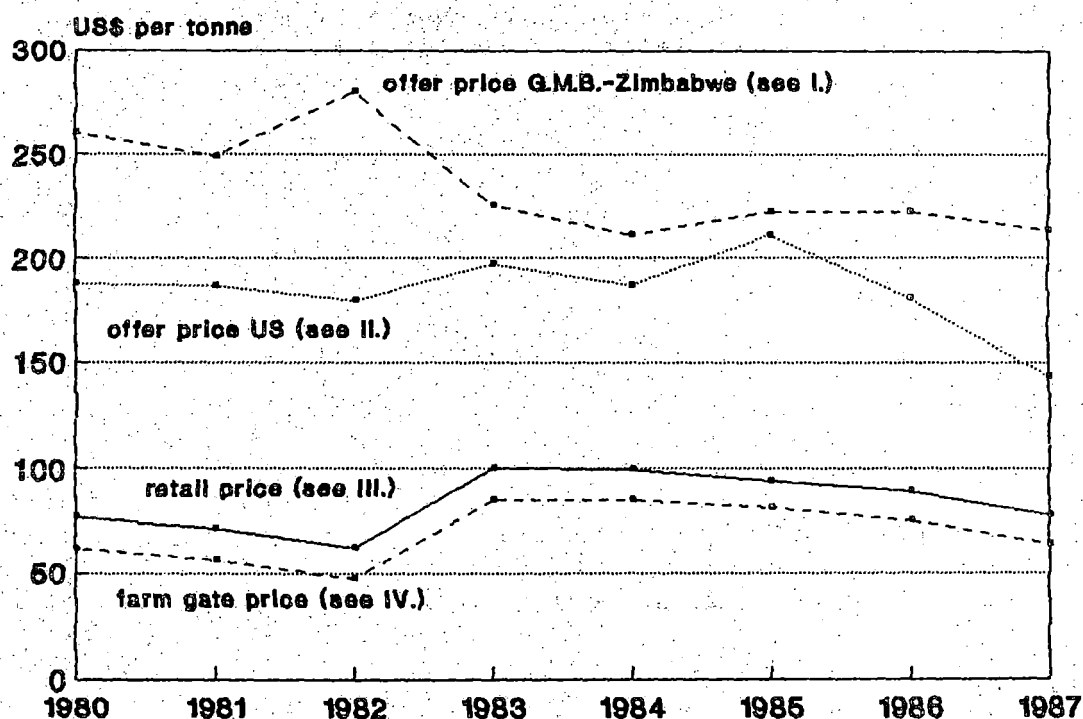
I.   GMB sorghum selling price + overland transport costs from
            Harare to Malawi border (US$.19/tonne/km).
II.   U.S. Gulf sorghum price + freight rate Nacala, Mozambique
            + overland transport costs to Malawi border.
III.   Informal market price in Blantyre and Malawi.
IV.   Informal farm gate price, selected markets in Malawi

Sources: Mbwanda   and   Rohrbach   (1988);   Louis   Berger   (1986);
            International Wheat Council (1987).

FIGURE 8: INTERNATIONAL SORGHUM PRICES AT BEIRA PORT

US$ per tonne

G.M.B. selling price plus freight to Beira (see I.)

fob US-Gulf plus Ocean Freight to Beira (see II.)

1980 1981 1982 1983 1984 1985 1986 1987 1988
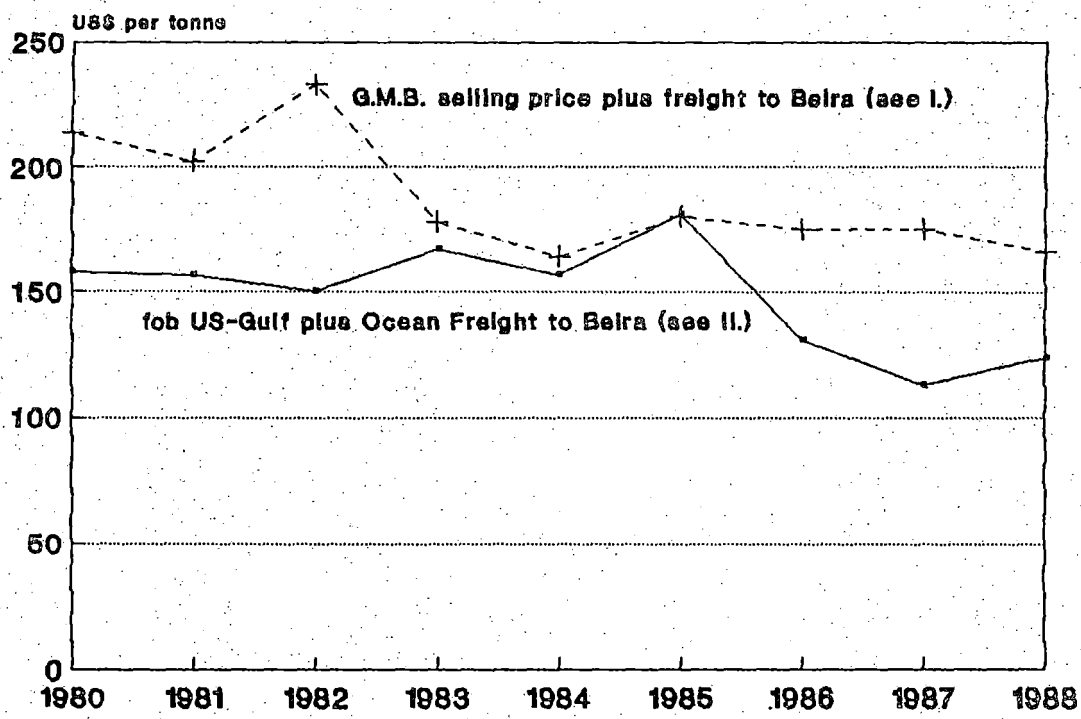
Sources: Mbwanda and Rhrbach (1988); Louis Berger (1986);
            International Wheat Council (1987)

International financial markets may also influence the viability of small grain export transaction in particular cases. Since most grain transactions are denominated in US dollars or a similar hard currency, volatile exchange rate fluctuation may greatly affect the operating account of the GMB.

Finally, the over viability of small grain trade within the region depends greatly on the infrastructural and institutional progress made in promoting overall trade and integration within SADCC. In this sense, enhanced small grain trade potential may be a positive side affect of broader efforts to vivify SADCC regional integration. Such benefits, however, must be seen as long-run in nature, and do not appear to be on the immediate horizon.

V. CONCLUSIONS AND POLICY IMPLICATIONS

Agricultural policies are conceived and implemented in order to benefit some group or groups. Whether or not small grain exports from Zimbabwe should be promoted depends on the government's objectives with respect to its small grains policy. We have assumed that these objectives include an equity dimension -- to promote income growth among smallholders in areas which have benefitted little from the "maize revolution" and an efficiency dimension -- to generate the greatest foreign exchange from a given level of national resources.

In this regard, the development of a viable small grain export potential in Zimbabwe will be affected by the following points:-

1. Zimbabwean small grain production is positively correlated with production in other SADCC countries, due to somewhat homogeneous weather patterns in the region. This pattern of synchronous production fluctuation raises the risks of investing in surplus production capacity, since good weather evaporate at the same time that Zimbabwe produces a large exportable surplus.

2. Small grain production and sales in Zimbabwe are highly concentrated. Commercial farmers account for about 75 percent of GMB red sorghum intake. One-half of all smallholder sorghum deliveries during the bumper harvest of 1985 came from five of Zimbabwe's 162 communal areas. In this setting attempts to induce greater small grain sales for export by raising producer prices will have very concentrated benefits, and may actually exacerbate the welfare of those that the government presumably is most actively trying to improve. Insofar as high GMB prices raise local village sorghum and millet prices, the poorest producers facing production deficits are being forced to pay more for their grain (Mbwanda and Rohrbach, 1989).

3. White sorghum, grown mainly in communal areas, may offer the greatest compatibility between government objectives and enhanced small grain exports. A limited but durable export demand may be generated from SADCC commercial millers attempting to reduce foreign exchange costs of bread manufacturing. However, better grain size standardization is necessary at the GMB to translate this potential demand into reality.

4. Import demand for small grains within the SADCC region is very thin and specialized. The longer run prospects for a broader regional demand are uncertain, due to uncertain future income growth within the region as well as the longstanding proclivity of neighboring countries to pursue self-sufficiency objectives.

5. Developing durable marketing infrastructure and information about import opportunities is costly, and might not be cost effective in terms of expected low trade volumes.

6. Present foreign currency regulations are obstacles to trade, and the same barriers limited intra-regional SADCC trade in general also apply to small grains in particular (Koester, 1986: Kingsbury, 1989).

7. Crops budgets within the Ministry of Lands for small grain and other exportable crops economically well-suited to semi-arid areas must be carefully analysed in order to evaluate the relative efficiency of foreign exchange generation from small grains. It appears to be a common perception that cotton and sunflower may generally afford better returns on world markets than most small grain varieties. More detailed analysis of crop budgets under a variety of communal and commercial farming characteristics would be valuable in clarifying the cost-effectiveness of long-run investments in sorghum and millet production and marketing to stimulate exports.

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APPENDIX 1

The source of production instability may be determined by decomposing the variance of annual percentage changes in production into area and yield components. Starting with the identity that production (PROD) equals the product of area (A) and Yield (Y), the total derivative of production is:

$$d(PROD) = Y*d(A) + A*d(Y)$$

Dividing both sides of the equation by PROD gives:

$$d(PROD)/PROD = d(A)/A + d(Y)/Y$$

Taking the variance of both sides gives:

$$Variance\ [d(PROD)/PROD] = Variance\ [d(A)/A] + Variance\ [d(Y)/Y]$$
$$+ 2*Covariance\ [d(A)/A, d(Y)/Y]$$

This technique allows one to discern the proportion of production variation attributable to yield and area instability as well as the interactions between them The results of the decomposition technique are presented in Table 3.

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