ECONOMIC ANALYSIS OF EXPANDING AGRICULTURAL EXPORTS
THE CASE OF COTTON IN ZAMBIA

by

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A Thesis
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A thesis submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
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MASTER OF SCIENCE

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ABSTRACT

This study has examined the economic efficiency of cotton production
for the export market from Zambia. The analytical approach used in the
study, weighs up, both from the farmers' and the nation's perspective,
the profitability of producing cotton relative to maize, the major com-
peting and food crop. Two farm categories of cotton and maize for the
crop year 1988/89 are analyzed; these are the smallholder and small com-
mercial farmers. In addition, the incentive or disincentive effects of
the pricing system, the importance of the cotton by-product, cottonseed,
and the international market for cotton are analyzed.

Results of the analysis have shown that, assessed by 'financial' and
'economic' criteria, it is more profitable for smallholder farms to
produce cotton than for small commercial farms. Measures of net finan-
cial profit, resource cost ratio and net economic profit are used to
reach this conclusion. A comparison of cotton and maize production indi-
cates that it is more financially and economically profitable for both
categories of maize producers than for cotton. Sensitivity tests of the
results of the analysis indicate that the conclusions drawn from these
results are stable across a range of parameter values. Estimates of nom-
inal protection coefficients show that producers of both cotton and
maize received a consistently high protection or high implicit taxation
as a result of the crop pricing policy. The major conclusion of the
study is that export of cotton lint may only be economically feasible if

efforts are made to improve producer incentives and marketing infrastructure by the Zambian government, and the world trade environment through multilateral negotiations.

ACKNOWLEDGEMENTS

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Chapter I

INTRODUCTION

1.1 GENERAL OVERVIEW

Agriculture in Zambia is an important sector in the economy: 60 per-
cent of the total population are dependent on agriculture for their
livelihood; agriculture employs 67% of the labour force; and agriculture
contributes 17% of the nation's Gross Domestic Product. Agricultural
output grew at an average of 2.8 percent per annum during 1965-85, which
was less than the population growth rate of 3.4 percent per year for the
same period.[1]

Zambia has the resources for expansion of its agricultural sector
through development of traditional and emergent producers as well as
large-scale agriculture. The country is endowed with an abundance of
land, labour, and water resources.

From the various national development plans,[2] government's stated
objectives in agriculture include the achievement of a more equitable
distribution of income and employment, attaining self-sufficiency in
major food crops (particularly maize), increasing the production of
import replacing commodities and diversification to widen the export
base of the economy through expanded production of agricultural commodi-

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[1] Republic of Zambia, Ministry of Agriculture and Water Development,
Investment Plan Taskforce Main Report, 1985

[2] 1st 1966-70, 2nd 1972-76, 3rd 1979-83 and 4th 1989-93

ties such as cotton, tobacco, coffee, oilseeds and fresh fruits and vegetables.

A major problem currently facing the economy of Zambia is the acute shortage of foreign exchange earnings. The most important source of foreign exchange for a long time has been exports of copper and other minerals such as cobalt, zinc and lead. The copper industry has not performed well since the mid 1970's as export earnings have deteriorated due to declining real prices, and demand on the world market.

The foreign exchange crisis has helped focus on agriculture as an alternative source of foreign exchange earnings if production and productivity can be increased. This requires that domestic agricultural policy be formulated with a careful view to its implication for trade in agricultural products. While accepting the goal of food self-sufficiency, it is also recognized that this goal cannot be treated in isolation of the need to produce export crops. They are an important means to generating the much needed foreign exchange without which food self sufficiency may be unattainable. The need to increase production of exportable agricultural commodities becomes more important given the declining capacity of the mining sector to generate foreign exchange.

The flow chart (Figure 1) summarizes the important linkages of an agricultural export strategy for Zambia and forms the basic framework of the study. From the flow chart, we note that in order to increase agricultural exports, incentives have to be in place to help achieve expansion in production i.e an important consideration is that of relative profitability of producing such commodities by local producers. Incen-

tives would include all measures that increase the profitability of exports by reducing costs or increasing revenue, such as export exchange rates, tax and duty concessions, foreign exchange retention schemes, and preferential credits. The general policy climate in which the incentive scheme is applied and the removal of distortions in factor markets is also of importance.

In order to export products, there is need for the product to be saleable, that is, a market must exist. Before encouraging farmers to produce a given product, there is need to examine consumption trends of the market, the extent to which other exporting countries have met the demand and the requirements for domestic production to achieve market penetration. As well, to export requires the existence of an appropriate market infrastructure to ensure that the product is processed, graded, packaged and presented in a form which will allow it to meet commercial demand. Availability and reliability of transport and storage facilities are important components of overall market infrastructure, as well as credit and commercial facilities including a sales network. This marketing infrastructure is the domestic linkage between production and the export customers. Without it, the existence of export markets and the existence of domestic production do not assure exports.

Production of agricultural export commodities has to be encouraged on the basis of certain criteria such as comparative cost advantage, international demand for the product, and employment generation within the domestic economy. By products which meet domestic needs if they exist, provide an economic advantage.

Zambia has a number of candidates for export development. According to the Zambian Government Investment Plan Taskforce Report (1985) and the World Bank (1987), the primary candidates are tobacco, cotton lint, coffee, fresh fruits and vegetables, tea, cashewnuts, some oilseeds (soybeans and groundnuts-for confectionery use), and beef.

From the set of alternatives, the export crop chosen to be analyzed in this study is cotton. Cotton in Zambia appears to have potential for value-added in processing. When raw cotton is ginned, the seeds are crushed into edible oil and the lint is spun into various yarns which are dyed and woven into cloth and fabrics. Cotton is the dominant raw material of the textile industry in Zambia. The country has achieved approximate self-sufficiency in cotton lint and has also become a net exporter of cotton lint since the early 1980's. Cotton was selected for this study because of these domestic contributions as well as its export potential. In particular, edible oil, the by product of cotton provides an important food product in most African countries. Zambia remains decifit in edible oils. In terms of Figure 1, cotton production has both foreign exchange generation and foreign exchange saving capacity. Consequently, the combination of conditions suggests cotton may be a desirable export crop.

This study is therefore oriented to issues of cotton lint supply and demand. It examines the country's comparative cost advantage in cotton production relative to another major cropping option- maize, trends in production, relative profitability of producing cotton to its important alternative crop, maize. The study also focuses on the adequacy of the marketing infrastructure for cotton, as well as export potential and

price implication of trade. An important aspect of cotton is that it is a major source of edible oil which is in high demand in Zambia.

1.2 PROBLEM STATEMENT

The expansion of foreign exchange capacity of an economy which is starved for foreign exchange is a relevant question for economic analysis. Traditionally, the agricultural sector has been a major contributor to foreign exchange generation in many developing countries in Africa. This, however has not been the case in Zambia. Most of the foreign exchange has come from the mining sector, that is, copper.

The share of agricultural exports in total exports (as indicated in Table 2), has been very low in Zambia, at no more than 3% per annum of total export earnings. The quantities of exported agricultural products have been very small or have declined in some years. This is attributed to low and in some years, declining production. In the four national development plans, the objective of expanding production of exportable agricultural products and increasing their share of foreign exchange earnings has been emphasized. However, to a large extent, the objective has not been realized. For example, foreign exchange earnings has remained at low levels while imports (wheat) have been increasing over the years. Low or declining production of agricultural exports implies a loss of potential or actual foreign exchange earnings for the country.

The Zambian economy is currently facing a severe foreign exchange shortage. The long term decline in foreign exchange earnings from copper, the major export commodity, coupled with large debt servicing obli-

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gations, have severely constrained the country's capacity to import raw
materials and capital goods. There is also indication that the copper
supply in Zambia may limit future exports of this commodity. Conse-
quently, the need to increase foreign exchange earnings from the agri-
cultural sector is more urgent than ever before.

This study will examine the prospects for increased production of one
crop, cotton which is judged to have significant potential in Zambia.
Justification and criteria for selecting cotton include the following:

1. It is a high value export product. Consideration has to be given
    to producing and exporting value-added products such as grey
    cloth and yarn,

2. Its by-product, cottonseed is an important source of edible oil
    for the domestic market. Given Zambia's shortfall in edible oil
    from other oilseeds such as sunflower, soybean and groundnuts,
    cottonseed supplements these as an important source of edible
    oil,

3. Cotton lint is an important import substitution product for the
    domestic textile mills which cater for the local market in terms
    of cloth and apparel,

4. The crop is predominantly grown by small-scale producers, which
    implies relatively labour intensive techniques of production,
    increased income and generation of more employment in rural are-
    as. A related advantage is that the crop requires less imported
    inputs in terms of production compared to say, tobacco.

The selection of cotton can be justified from the information provided by several sources: Lintco, Investment Plan Taskforce Report 1985, United Nations Development Program "Restructuring and Development in Zambia" 1986, and Purvis, D. "Domestic and Foreign Currency Cost of Production for Selected Crops in Zambia" 1987. In all these sources, cotton is highly recommended as one crop the country should encourage for export development.

1.3 OBJECTIVES OF THE STUDY

The general objective of the study is to develop a framework for investigating and evaluating the prospects for increased production of specific agricultural crops for export in Zambia, and to apply that framework to determine the export potential of cotton. Specific objectives include:

1. to formulate a general framework which identifies the potential and constraints to increasing exports in agricultural crops; and apply the framework to the crop cotton in the following way;

2. indicate the relative profitability of cotton production to its major alternative crop, maize in order to determine feasibility of increasing the supply of cotton;

3. examine market infrastructure and other aspects of marketing which influence ability to increase exports and recommend changes where indicated;

4. examine policies affecting production of cotton in Zambia and determine prospects of increasing supply to meet and sustain exports of cotton lint; and

5. identify the benefits from export development including such factors as employment, edible oil production, and value-added activity.

It is this set of objectives which direct the course of the study.

Figure 1: Flow Diagram: Process of Agriculture
Export Market Development: Zambia

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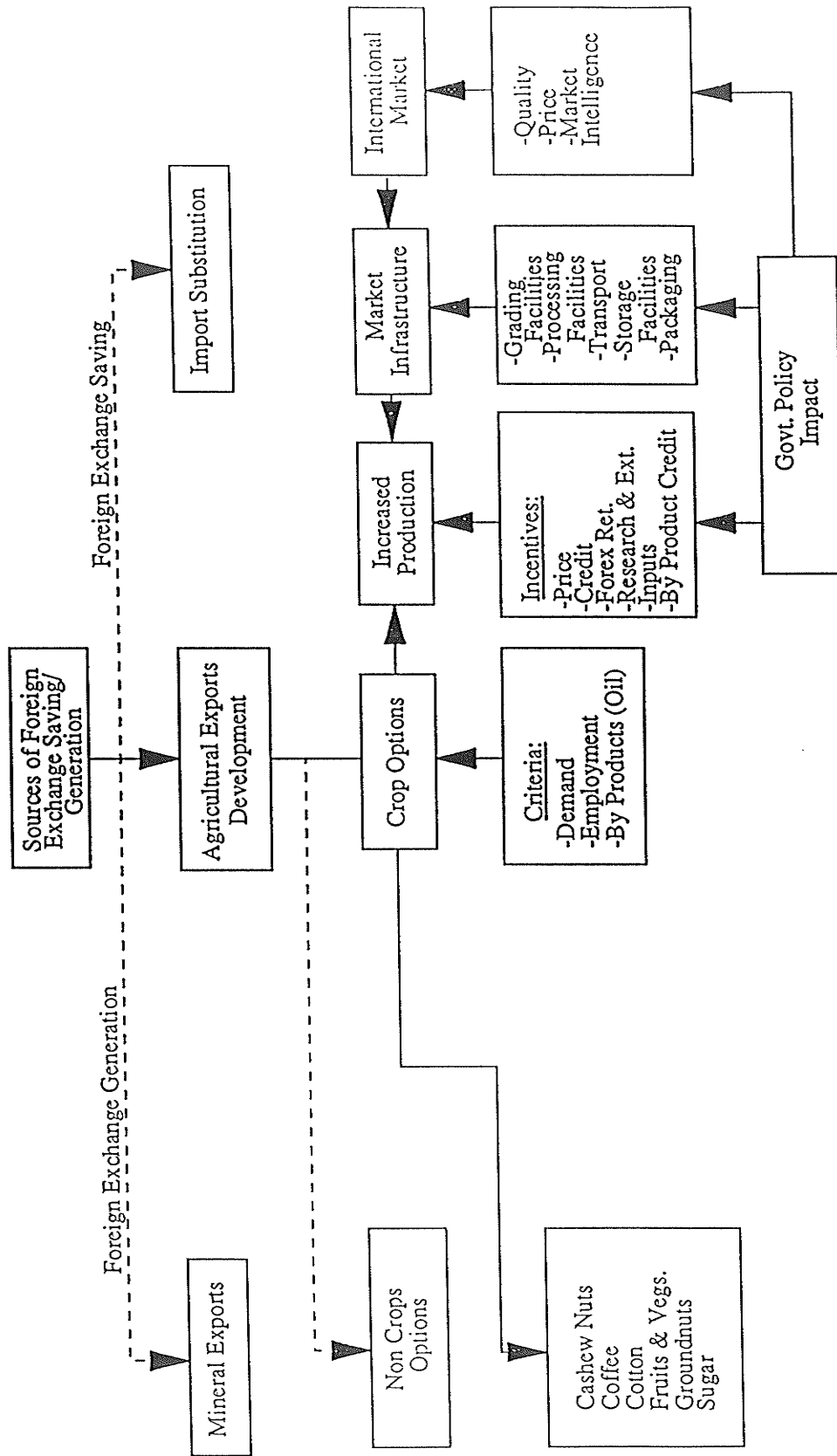
Chapter II

THEORY AND LITERATURE REVIEW

This chapter reviews relevant literature on theoretical issues and approaches to analyzing export expansion strategies and how such an approach may be applied to the cotton sub-sector in Zambia.

To develop an economic framework for analyzing export expansion strategy for agricultural products, it is important to review certain relevant aspects of trade theory. These include the theory of comparative advantage and its measurement and gains from agricultural trade. This approach is chosen because it has important policy and development implications for agricultural export expansion.

The theory and literature review that follows highlights the basis for analyzing export development for agricultural commodities. It is important that agricultural export development undertaken by a country like Zambia be economically efficient (as measured by comparative advantage) as well as profitable to farmers, in order to induce increased production. An important aspect to consider as well is the role of marketing infrastructure in export development. Market infrastructure is necessary to ensure that quality products are exported as well as to provide an efficient means to deliver the product to where it is wanted.

2.1 THEORY OF COMPARATIVE ADVANTAGE

Comparative advantage is an expression of the efficiency of using resources to produce a particular product when measured against the possibilities of international trade.[3] According to the classical comparative advantage principle, economic growth is promoted by specialization. When a country specializes in the production of the commodity or commodities in which it has comparative advantage, its production is maximized for a given resource use; when all countries specialize and trade the total world output of every commodity increases with the result that all countries become better off.[4] A major criticism of the the classical version of comparative advantage is that it is essentially a static concept which ignores a variety of dynamic elements.

The modern version of comparative cost doctrine is essentially a simplified form of static general equilibrium theory.[5] According to the modern version, the optimum pattern of production and trade for a country is determined from a comparison of the opportunity costs of producing a given commodity with the price at which the commodity can be imported or exported. In equilibrium, no commodity is produced which could be imported at lower net cost, and exports are expanded until marginal net revenue equals marginal net cost.[6] The two major assumptions

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[3] Byerlee, D.and Longmire, J. "Comparative Advantage and Policy Incentives for Wheat Production in Rainfed and Irrigated Areas of Mexico" CIMMYT Economic Program. Working Paper No. 01 1986. p4

[4] Chacholiades, M. Principles of International Economics. 1981.

[5] Ethier, W. "Higher Dimensional Issues in Trade Theory" in Jones, R.W. and Kenen P.B. (eds) Handbook of International Economics. Vol.1. 1984

[6] Chenery, H. "Comparative Advantage and Development Policy" American Economic Review. Vol. 51 pp18-51 March, 1961

of the modern version of comparative advantage are; full employment and perfect competition. Given the two assumptions, the opportunity cost of a commodity, which is the value of the factors used to produce it in their best alternative employment, is equal to its market value. Market prices of factors and commodities can therefore be used to determine comparative advantage under competitive conditions.

An important variant of the modern version of comparative advantage is that of Heckscher-Ohlin. The Heckscher-Ohlin version of comparative cost provides a measure of comparative advantage that does not depend on the existence of perfect competition and initial equilibrium. This version states that a country will benefit from trade by producing commodities that use more of its relatively abundant factors of production. For example, Zambia has an abundance of land and labour. A country will export commodities using more of its relatively abundant factors of production and import commodities using more of its relatively scarce factors unless its pattern of domestic demand happens to be based toward commodities using domestic factors.[7] The critical assumptions of the Heckscher-Ohlin analysis are that factors of production are comparable among countries and that production functions are similar. These assumptions are not required by classical trade theory.

The Heckscher-Ohlin version has been criticized on the basis that its assumption of comparative factors does not allow for observable differences in their quality. Hence it is felt that comparative advantage has to be interpreted in a dynamic setting in which the efficiency of production may change over time, external economies may exist, and the mar-

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[7] Chenery, H. 1961 Ibid. pp20-30

ket prices of commodities and factors may differ from their opportunity cost.[8]

The theory of comparative advantage is usually analyzed on a two-commodity, two-country basis. However, the theory has been extended to a many commodity sector analysis. In so doing, economists have come up with the concept of 'a chain of comparative advantage.'[9] The concept holds that trade in many commodities can be understood by first ranking the goods according to factor intensities, then showing that all of a country's exports must lie higher on this list than all of its imports. The chain of comparative advantage idea is valid so long as there are unequal factor prices and free trade. When impediments to trade such as tariffs, the presence of transport costs and intermediate goods are added, the chain of comparative advantage proposition collapses. While these impediments to trade are a fact of life and their presence may seem to cast doubts on the concept of comparative advantage, the theory is still valid and it has withstood various tests.

Comparative advantage theory is usually demonstrated with the help of the two-country, two-commodity diagram of trade theory. We will consider the case of free trade and briefly mention the case where we have distortions to trade. The following are important assumptions to consider in this approach.[10]

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[8] Viner, J. International Trade and Economic Development. Oxford 1953.

[9] Deardorf, A. "Weak Links in the Chain of Comparative Advantage Theory" in Bhagwati, J. Selected Readings in International Trade. pp101-103 1987.

[10] Deardorf, A. ibid. p103

1. there are two countries A and B producing and trading in goods
    with no barriers to trade between them (prices of goods are the
    same between them),

2. production of each good requires the use of only two factors of
    production capital (K) and labour (L) which are non-traded in
    each country in fixed supply,

3. production functions are identical between countries and have the
    properties of concavity and homogeneity,

4. the goods can be ranked unambiguously in terms of capital inten-
    sity, X1 being the most capital intensive and Xn, the least,

5. perfect competition prevails in both countries, so that price
    equals average cost for any good that is produced.

Isocost lines for the two countries are indicated by AA for country A
and BB for country B in figure 2.   These represent the combinations of
capital and labour which cost a unit of a currency in each of the two
countries. The isocost lines intersect at point M, with country A
depicted as having a higher ratio of wage to rental than B.   From the
figure, the pattern of trade must agree with the ranking of the goods
by factor intensities. The most capital-intensive goods (1,2,3) can only
be produced in the high wage country A and also exported by A, while the
most labour-intensive (5 and 6) must be produced and exported by B. Good
4 may be produced in both countries and may be exported by either. Good
4 therefore constitutes the division of the chain of comparative advan-
tage.

If barriers to trade (such as tariffs and transport costs)   are
allowed, the above argument is no longer valid, for there will be dif-

ferent unit-value isoquants in the two countries. This is shown by the dotted isoquant X'5 below the intersection M for good xi of county A. For the good to be exported from A, it must also fetch at least as high a price in country B to cover any transport cost or tariff. This would place B's unit value isoquant for the same good still closer to the origin than X'5 and inside line BB. The good would then yield a positive profit in B which is impossible.

The theory of comparative advantage discussed above should be seen in the context of this study as a useful theoretical backdrop to analyzing trade in agricultural commodities. In promoting development of agricultural export commodities, we may consider static and dynamic comparative advantage as a useful guide to efficient use of resources in order to achieve an efficient pattern of growth of the agricultural sector, including the export sub-sector. However, it should be recognized that there are measurement problems in estimating comparative advantage. These stem from the mathematical rigor involved in the estimation as well as elaborate data requirements. Since comparative advantage is about resource use efficiency, this still renders it a useful analytical tool.

Figure 2: Comparative Advantage
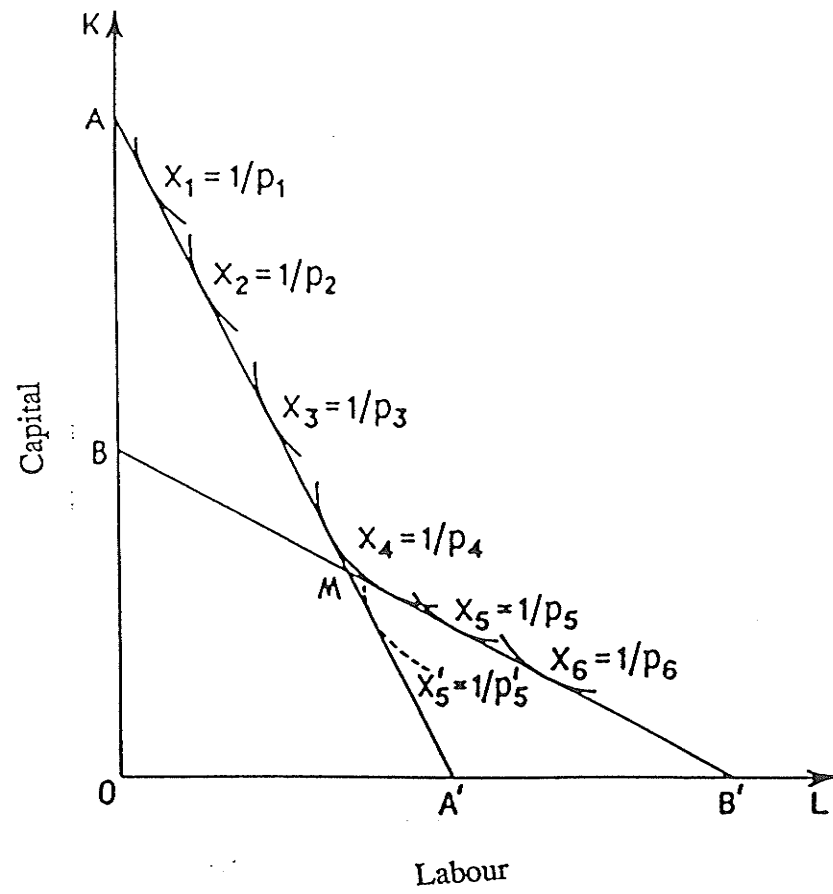
2.2 MEASUREMENT OF COMPARATIVE ADVANTAGE

Measurements of comparative advantage are an important indicator of resource use efficiency. These measures, properly calculated from a good data base, may indicate whether resources should be committed to producing or increasing production of a crop (such as cotton for export development). If a commodity has comparative advantage in production, we can promote its production and sell it on the international market in order to earn foreign exchange. However, the premise for this production is that the product must be saleable in the world market.

In order to be able to apply the concept of comparative advantage and to provide estimates, the following assumptions are required:[11]

1. the world price of the output is given exogenously and is estimable,

2. incremental costs of production, determined by a given technology and an assumed set of relative factor prices, are subject to sensitivity analysis to reflect changed assumptions,

3. shadow prices of inputs and outputs, which are representative of the true opportunity costs of factors and of the true scarcity values of commodities are calculable and;

4. the true foreign exchange costs of production can be calculated.

The Domestic Resource Cost Ratio (DRC) or simply Resource Cost Ratio (RCR), is the widely used proxy measure of comparative advantage.[12] For example, a ratio greater than one for cotton implies that the value of

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[11] Pearson S. et al Food Research Institute Studies. XV, 2 1976. pp2-15

[12] Bruno, M. "Domestic Resource Costs and Effective Protection: Clarification and Synthesis" Journal of Political Economy. 80 (1972) p16-33

the domestic resources employed is greater than the value of the foreign exchange saved or earned. This would indicate that a country has no comparative advantage in the production of cotton.

The RCR is essentially an application of cost-benefit analysis to international trade problems, and may be utilized to analyze both import substitution and export promotion policies.[13] When applied to export promotion, the benefits amount to the foreign exchange earned on the exported goods (net of foreign exchange input costs) and the costs comprise the value of domestic resources necessary to produce these goods. The approach essentially entails estimating the domestic resource cost necessary to earn one unit of foreign exchange to see if it is an efficient earner of foreign exchange. The following index which is the ratio between domestic resource costs and net foreign exchange earned in an activity is a proxy measure of comparative advantage:

$$dj=(\sum a_{ij}P_i + \sum f_{sj}V_s)/(U_j-M_{1j})$$

where:

    dj = the domestic resource cost ratio

        of good j

    a_{ij} = the amount of nonprimary input

        i necessary to produce one

        unit of j

    P_i = the shadow price of nonprimary

        input i

    f_{sj} = the amount of primary input s

        necessary to produce one unit of j

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[13] Savasini, J. *Export Promotion Policies, the Case of Brazil.* Praeger Publishers 1978. p53

Vs = the shadow price of primary input s

Uj = f.o.b. value of output j

$M1j$ = is the dollar value of imports of

good per unit of j

$(Uj-M1j)$ = represents the net foreign currency

earnings per unit of output. This

term is assumed to be positive

This ratio is interpreted as the export opportunity cost incurred by society when the import of one dollar's worth of good j is substituted by domestic production or when an additional dollar's worth of j is exported. The DRC can thus be summed up as the ratio of domestic resource costs and net foreign exchange earned or saved. Apart from the above method, there are other approaches to estimating DRCs and numerous theoretical problems to be resolved. One approach is simply to take the ratio of present worth of domestic currency cost of realizing foreign exchange saving and the present worth of net foreign exchange saving.[14] Yet another approach for estimating the DRC is simply to take the ratio of unsubsidized domestic costs and the difference between revenue from producing a product, and the economic foreign exchange costs. This is one approach recommended by the World Bank and appears easier to use.[15] These approaches may result in DRCs estimates that are slightly different.

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[14] Gittinger, J.P. Economic Analysis of Agricultural Projects. 1982 pp398

[15] Scandizzo, P.L. and Bruce, C. "Methodologies for Measuring Agricultural Price Intervention Effects" World Bank Staff Working Paper. No. 394 June, 1980.pp 5-30

The RCR is calculated by segregating inputs and outputs used in production into tradeables and non-tradeables. Tradeables are commodities which are imported or exported. Nontradeables are resources (such as land and labour) that do not usually directly enter international trade.[16] All tradeable commodities are valued at their actual world price equivalents. This is the price at which the commodity can be imported (or exported), adjusted for transport costs and exchange rate anomalies. Inputs which are partly tradeable and partly domestic (e.g. transport with tradeable fuel and parts, but non-tradeable labour), are divided into their tradeable and domestic components. Non-tradeables are valued at their returns in alternative opportunities (valued at market prices).

This measure of comparative advantage has been criticized on the grounds that it does not evaluate the nonprimary inputs at their international free-trade prices. Further, data problems make it difficult to estimate accurately DRCs and they tend to vary with changes in world prices. However, DRCs are still useful in assessing comparative advantage.

The DRC approach is commonly used by the World Bank. The DRC concept is useful in developing countries facing balance of payments problems and contemplating projects with import substitution or export enhancement objectives.[17] Calculation of DRC reveals the cost of saving or earning a unit of foreign exchange in terms of its domestic currency.

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[16] Byerlee, D. and Longmiure, J. p5 1986.

[17] Srinivasan, T.N and Bhagwati, J.D. "Shadow Prices for Project Selection in the Presence of Distortions: Effective Rates of Protection and Domestic Resource Costs" <u>Journal</u> <u>of</u> <u>Political</u> <u>Economy</u>. Vol. 86 No. 1 1978 pp97-116

The production technique used has an important influence on the resource cost ratio. In most cases a country has several different actual or potential production regions for a crop with different technologies, yield potentials, and competing crops. Hence the resource cost ratio is likely to vary from region to region. This is important because it provides a measure of the efficiency of resource use between regions.

In analyzing comparative advantage, the data used will have great influence on the validity of the conclusions reached. Generally speaking, the methods for measuring comparative advantage are usually theoretically sound but empirically weak due to lack of adequate data. This is even more so for developing countries.[18]

While the RCR is a measure of the efficiency of resource use, governments have other objectives in resource allocation besides efficiency, such as income distribution, employment generation, and domestic self-sufficiency. Nonetheless, the efficiency of resource use is important to economic analysis and any measure which enables decision makers to quantify the cost of pursuing other objectives will provide considerably more information than is currently available.

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[18] Hsi-huang Chen "Incentives for agricultural production in Taiwan, some Comparative Advantage Perspectives" Dept. of Agricultural Economics, National Taiwan University, undated paper.

2.3 MEASURING POLICY INCENTIVES/DISINCENTIVES

Government policy on important variables like prices, exchange rates, taxes and subsidies have an important effect on production and trade of agricultural products. Policy may have positive or negative effects on prodution and trade. In promoting export crop production, it is therefore important to calculate efficiency measures in order to determine the extent to which producers are encouraged or discouraged by the incentives or disincentives in place.

Measurements of policy incentives/disincentives are closely related to measures of comparative advantage.[19] The following are some measures of policy incentives/ disincentives suggested by various economists:

1. Nominal Protection Coefficient (NPC). This is a measure of the effect of policy incentives which provides the ratio of domestic prices to world prices (adjusted for transportation charges). For producers it is defined as:

    $$NPCi = Pid/Pib$$

    Where:

    NPCi =Nominal Protection coefficient of the ith commodity

    Pid =domestic price of the ith commodity

    Pib =border price of the ith commodity, with the border
    price being its foreign price times the official
    exchange rate.

    NPCs may be expressed as units or percentages. For example, an NPC less than 1 implies that pricing policy discriminates against exports. Since official exchange rates are often a poor

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[19] Scandizzo, P.L. and Bruce, C. op. cit. 1980 pp20-24

guide to the real value of foreign exchange i.e. the official exchange rate may be overvalued, it is often useful to also calculate the NPC with a 'corrected' exchange rate to convert world prices to local prices. The difficulty with this approach is the problem of choosing a realistic exchange rate.

2. Effective protection coefficient (EPC). This is a summary of incentives or disincentives created by government price policy interventions in input and output markets. It is said to be a better measure of policy incentives than the NPC as it takes into account effects of policies on input prices such as a subsidy on fertilizer which increases the incentives for local production. The EPC is measured by the ratio of the value added[20] expressed in domestic market prices to value added expressed in border prices:

$$EPCi = VAdi/VAbi$$

where:

EPCi= Effective Protection Coefficient

in the ith activity or commodity

VAid= Value added per unit of output

in the ith activity or commodity at

domestic prices

VAib= Value added per unit of output in the

ith activity or commodity at border

prices

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[20] Value added is defined as the value of the output at any point in the production distribution process in any period, less the value of the purchased inputs in the same period, less depreciation. The sum of value added in an economy equals Gross Domestic Product.

An EPC less (greater) than one indicates that policy is a potential disincentive (incentive) to production of a particular commodity. However, the incentive provided by pricing policy on a particular crop must be measured against incentives provided to other crops. Effective Protection coefficients are intended to capture the effect on output price as well as effects on prices paid for inputs, that is, effect on value added. Ideally these should be estimated in addition to NPCs and a comparison made between the two. Estimates of EPCs will not be done in this study due to inadequate data.

3. Producer subsidy equivalent (PSE). This is the subsidy net of indirect taxes given to producers, expressed as a percentage of the market value of each commodity. The PSE provides some broad information about the income distribution effects to producers.[21] PSE estimates are expressed in three ways:[22] (i) the total value of transfers, derived by summing the estimated value for each policy or group of policies; (ii) the per unit value of transfers, derived by dividing total transfers by total production; and (iii) the percent PSE, estimated as total transfers divided by adjusted producer income.

An important advantage of some of the above measures, notably the NPC, is that they are relatively easy to calculate given a sound data base. However, they also have their shortcomings. For instance, estimates of NPCs ignores the effect of price distortions on intermediate

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[21] Josling, T. and Tangerman, S. "International Negotiations on Farm Support Levels: The Role of PSEs." Working Paper No. 87-3 1987.

[22] USDA Economic Research Services, "Agriculture in the Uruguay Round: Analysis of Government Support" 1988.

inputs in production. EPCs, are difficult to calculate and interpret, in particular when trade value added is low or negative. Controvesy still surrounds estimates of PSEs as to methodological details, and timeliness of calculation, given year to year fluctuations in agricultural markets. Further, PSEs are said to be poor proxies for agricultural trade distortions, are measured relative to observed (distorted) world prices, and are not strictly comparable between countries.[23] Despite these shortcomings, the measures are still useful indicators of distortions in agriculture especially in view of widespread government intervention in the sector.

These measures of policy incentives may be useful in understanding trends in cotton production in Zambia. For example, stagnant production may derive from lack of price incentives or inadequate marketing infrastructure; but it may also be related to deteriorating measures of policy incentives provided to producers. Measures of policy incentives might be compared across regions to assess to what extent changes in policy have favoured particular regions. While these methodologies have their drawbacks, used with analytical care, they can detect some of the effects on agricultural production and broad welfare transfers from agriculture to consumers and to other sectors.[24]

In many developing countries, there are dual agricultural production-marketing subsystems, one oriented toward export markets and the other toward domestic food needs. The export-oriented subsystem is usually

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[23] McClatchy, D. "The Concept of Producer Subsidy Equivalents: Some Considerations with Respect to its International Negotiability." Draft Paper, 1987a.

[24] Scandizzo, P.L. and Bruce, C. 1980 pp22-24

said to be better organized in terms of pricing and handling procedures.[25] However, a major problem of both marketing subsystems in most developing countries like Zambia is the poor or inadequate condition of marketing infrastructure. Marketing costs are usually high when roads and communication are poor, when interest rate and storage losses are high, and when processing facilities are poorly maintained and operated. It is therefore important to locate these areas of high marketing costs, to identify any inefficiencies and monopoly profits if they exist, and to propose policy initiatives and investments that will lower real costs of marketing.[26]

There have been several studies on agricultural export commodities from developing countries, covering a number of issues and employing different analytical techniques. An econometric study on commodity exports notes that there has been substantial changes in the commodity structure of developing country exports over the past two decades.[27] Data show a decline from 1965 to 1980 in the share of goods from all developing countries in the commodity imports of industrial countries. Both demand and supply reasons for these changes are suggested. On the demand side, Bond's study focusses on the role played by commodity composition, proximity to markets and industrial country policies. On the supply side, the study examines factors such as relative prices, domes-

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[25] Riley, H.M. and Weber, M.T. "Marketing in Developing Countries" in Farris, P.L. (ed) Future Frontiers in Agricultural Marketing Research. 1983

[26] Timmer, P. et al "Marketing Functions, Markets, and Food Price Formation" Food Policy Analysis. 1983

[27] Bond, M. "An Econometric Study of Primary Commodity Exports from Developing Country Regions to the World" IMF Staff Papers. Vol. 34 (1987) pp191-227

tic resource use, population growth and the local endowment of natural resources as well as the influence of domestic policies. Empirical results point to the low price elasticities of supply that are in general lower than the corresponding price elasticities of demand in the short-run but are more sensitive to price in the long-run.

A general study on sub-saharan Africa's agriculture notes that countries in the region are heavily dependent on primary commodity exports for their foreign exchange earnings.[28] That study asserts that in the last three decades, world prices of agricultural commodities in relation to world prices of manufactured products have tended to fall. This has resulted in declining terms of trade. The study identifies possible areas of action to enhance the prospects for aggregate export earnings from agriculture. These include; increasing total production and diversification of crops, increasing yields to augment sub-saharan competitiveness, increasing the value-added component of exports by expanding processing, and stabilizing or raising world prices through international action.

While a number of studies have been carried out on the agricultural economy in Zambia, very little analytical work has been done on trade prospects for agricultural commodities and the potential of the sector to generate foreign exchange. It is therefore hoped that this study will be a useful contribution in this area.

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[28] Singh, S. "Sub-Saharan Agriculture, Synthesis and Trade Prospects" World Bank Staff Paper. No. 608 1983

Chapter III

THE PHYSICAL, ECONOMIC AND AGRICULTURAL SETTING

3.1   THE PHYSICAL ENVIRONMENT

Zambia is a land-locked country covering some 752,614 square kilo-
meters and is located in the southern part of Africa.   The country's
population is currently estimated at 7.1 million with an annual growth
rate of 3.4% per annum.   Some 40% of the population live in urban areas
while the rest is in rural areas.[29]

The country has good weather for producing various crops as well as
livestock rearing.   The rain season stretches from October up to the end
of March and annual rainfall ranges from 1270mm in the northern part of
the country to about 600mm in the west and south.   There are 12million
hectares of land cleared for agriculture.   The land can be divided into
four agro- climatic zones:[30] (i) the northern high rainfall zone.   This
covers an area of 35 million hectares and has high rainfall of over
1,270 mm.   It contains highly leached and relatively infertile soils
which are best suited for perennial crops such as coffee and tea which
are currently grown in this area,   in addition to cassava, sorghum and
millet. Other crops grown are maize,   cotton and soybeans.   (ii) the
western semi-arid plains. This covers an area of 20.8 million hectares.

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[29] Republic of Zambia, Central Statistics Office, Zambia in Figures
    1987.

[30] Republic of Zambia,   Ministry of Agriculture and Water Development,
    Investment Plan Taskforce Report 1985.

The area is generally unfavourable for crop cultivation because annual rainfall averages less than 800mm. The zone supports a substantial traditional herd of cattle. Current crops grown in this area include cassava and maize. (iii) the Luangwa-Zambezi rift valley covers some 10.1 million hectares and is a hot, low rainfall area (less than 800mm). It has potential for small-scale flood irrigation. The current crop grown in this area is rice. (iv) central, southern and eastern plateaus covers some 9.4 million. The area has more fertile soils and conditions are favourable for crop production. This area currently produces a wide range of crops, maize being the most important. Other major crops include sunflower, cotton, groundnuts, wheat, tobacco and soybeans. The area is also noted for its livestock production notably, beef, dairy, pigs and poultry.

3.2 THE ZAMBIAN ECONOMY: A BRIEF OVERVIEW

The economy of Zambia is heavily dependent on the production of copper and other minerals which together constitutes about 95% of the country's total exports. Since 1975, the country has been gripped by steadly worsening economic crises. The economic crisis in Zambia can be attributed to both external and internal factors. The primary export commodity, copper, has suffered falling real prices as far back as 1972. Rising oil prices until 1984 led to a high oil import bill for the economy. Drought in some years (e.g 1987) has had a negative impact on agricultural production. As a result of declining terms of trade and continued borrowing, Zambia has accumulated an enormous foreign debt currently estimated at 5.7 billion U.S. dollars.[31] This implies that a

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[31] IMF Survey 1989.

substantial portion of the country's meagre foreign exchange from copper have had to go towards debt servicing. As a result of this, the Government of Zambia took a decision in 1987 to limit debt payment to 10 percent of total foreign exchange earnings. A major consequence of the economic stagnation has been that real per capita incomes have fallen by 22 percent in Kwacha terms between 1978 and 1987.[32] Balance of payment deficits and inflation rates have been rising. The combination of dwindling export earnings and rapidly rising costs of the imported inputs (on which industry is presently heavily dependent) has increased the external vulnerability of the economy, reducing real imports.

Maintenance of an overvalued exchange rate (as asserted by the IMF and World Bank), and other government induced market distortions have had a negative impact on agricultural growth in Zambia as they have discouraged increased production of agricultural exports. The drop in the value of the Kwacha during the foreign exchange auction system of 1986/87 and the difference between the official nominal exchange rate and the parallel market rate is said be indicative of the overvalued Kwacha. However, by the end of 1989, the value of the Kwacha had dropped to the level of K21.10 per one U.S. dollar.

An acute shortage of foreign exchange earnings means that the country has found it increasingly difficult to import the required amount of vital inputs, spares and machinery. The result of this is that most industries continue to operate at very low capacity. The foreign exchange crisis implies that there is need to explore alternative sourc-

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[32] Young, R. "Zambia: Adjusting to Poverty" North-South Institute, 1987

TABLE 1

Average exchange rates for Zambia: selected years

Kwacha in terms of U.S. $

Year	Exchange Rate
1970	1.00 = 1.40
1975	1.00 = 1.55
1980	1.00 = 1.27
1981	1.00 = 1.15
1982	1.00 = 1.08
1983	1.00 = 0.80
1984	1.00 = 0.56
1985	1.00 = 0.37
1986	1.00 = 0.14
1989	1.00 = 0.10

Source: FAO Trade Yearbook Vol. 40 1986.
        IMF International Financial Statistics
        (various issues)

es of foreign exchange earnings. The agricultural sector offers one of the best opportunities for foreign earnings if production and productivity can be increased from the sector. This requires that domestic agricultural policy be formulated with a careful view to its implications for trade in agricultural products. The agricultural sector can play an important role in the transformation of the economy, since it is least dependent on imported inputs and has capital requirements which are much lower than those of the other sectors such as mining and industry.

3.3   THE AGRICULTURAL SECTOR

A number of crops are grown in Zambia by various categories of pro-
ducers. The country has a favourable climate to produce a variety of
both food and nonfood crops in addition to livestock rearing. Maize is
by far the most important crop in terms of food supply, cropped area,
and the number of farmers; it accounts for nearly 75 percent of marketed
output.[33] The other significant crops are tobacco, cotton, sunflower,
groundnuts, sugarcane, rice, soybean, cassava, millet, sorghum, coffee
and tea.

Zambia's farmers can be grouped into three distinct categories.[34]

1. traditional (subsistence) farmers. These number about 450,000 or
    75% of the estimated 600,000 farm households. They cultivate an
    average of 2-5 hectares using family labour and simple hand
    tools, and produce primarily for their subsistence with only
    occasional marketable surplus. Lack of regular cash income limits
    the use of purchased inputs by this group of farmers. This group
    grow crops such as sorghum, millet, cassava and maize largely for
    own consumption.

2. medium (emergent) farmers. These number some 130,000 or 21% of
    the total farm households. They cultivate an average of 10-15
    hectares each and produce both for their own consumption and
    largely for the market. Most of these farmers are concentrated
    along the line-of-rail and eastern province and thus have easy

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[33] Mwape F.K. "Relative Economic Efficiency of Emergent and Commercial
Maize Farms in Zambia." Unpublished Phd Thesis, University of Mani-
toba 1988.

[34] Republic of Zambia, Investment Plan Taskforce Report. 1985

access to infrastructure (such as good road network and storage
facilities), marketing and credit. They grow 60 percent of the
marketed maize, most of the cotton, sunflower and rice, and also
produce a large part of the marketed beef.

3. commercial and large-scale farmers. These constitute about 4% of
the farm households and cultivate an average of over 60 hectares
each. They are usually highly mechanized, using tractors, irriga-
tion equipment and other agricultural machinery. They account for
about 40% of the marketed maize and 55% or more of marketed
tobacco, wheat and soybeans, and less than 10 percent of cotton
production.

Marketing of agricultural produce in Zambia is done by a number of
marketing organizations that can broadly be classified into three cat-
egories: (i) provincial co-operative unions (ii) state or parastatal
boards and (iii) private marketing agencies. The nine provincial co-op-
erative unions (PCU's) are responsible for purchase and transportation
and storage of maize and a number of other cash crops such as sunflower.
The PCUs also distribute inputs such as fertilizers and seeds. There
are a number of parastatal marketing organizations. The Lint Company of
Zambia (LINTCO) is responsible for cotton, smallholder soybeans and cof-
fee. The Zambia Coffee Company (ZCCL) buys, processes and sells coffee
for export. Zambia Horticultural Products ltd (ZAMHORT) buys, processes
and sells horticultural products including rice. The National Tobacco
Company (NATCO) is responsible for marketing and processing of tobacco
and for provision of technical assistance to producers. The Zambia Seed
Company (ZAMSEED) is the specialized agency for crop seeds.

The Zambian agricultural sector has experienced slow growth, and in some years, production has declined. Growth of the agricultural output averaged 1.8 percent per annum during 1974-79 and only 1% during 1979-83.[35] During the post-independence period 1965-82, most of the growth in the agricultural sector occurred in the commercial sector where marketed production grew at annual rate of nearly 6% while traditional agriculture remained almost stagnant with a growth rate of only about 0.3% per annum.

Since the beginning of the 1980s, this pattern has changed. The rate of growth in the commercial farming sector has declined due to inadequate allocation of foreign exchange required to import farm machinery, spares and inputs upon which the commercial sector is heavily dependent. On the other hand, production in the traditional sector, minimally affected by the foreign exchange scarcity, has been growing in response to favourable weather conditions and satisfactory producer prices. There has also been an emergence of a growing number of market-oriented smallholder farmers.

Despite recent production increases and some shift in the sources of output growth, the development of Zambia's agriculture remains far below potential as reflected in the country's resource base. The sector's contribution to the diversification of the economy has remained minimal as indicated by its low share of real GDP and low export base. (Table 2)

The long-term slow growth of agriculture has largely been due to the general neglect of the sector, and inappropriate policies and institutional structures. The marketing of produce has been the virtue monopo-

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[35] World Bank, "Zambia: Country Economic Memorandum." 1986

ly of government parastatals and cooperatives which have operated within a system of administered pan-territorial pricing system which distorts economic production and distribution patterns and leads to high operating expenses and losses of the state enterprises involved.[36] The allocation of government budgetary resources to the agricultural sector has been small; until 1982, only 3% of the total budgetary expenditure went to agriculture.[37] Furthermore, most of the financial resources earmarked for agriculture have been devoted to agricultural subsidies instead of to capital expenditure. Agricultural parastatals continue to place a heavy burden on government finances. As a result, government support for agricultural services to farmers such as research, extension, and credit have been limited.

The agricultural sector is nonetheless an important sector in the country's economy as indicated by the proportion of the population which derives its livelihood from the sector. In recent years, the agricultural sector is increasingly being relied upon to feed an expanding urban population and contribute to the foreign exchange needs of the economy by import substitution as well as through expanded diversification of exports. Thus the agricultural sector has a challenging role to perform in Zambia.

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[36] Young, R. pp5-10 1987

[37] World Bank, "Zambia: Policy Options and Strategies for Agricultural Growth." June 1984

Role of Agriculture in the Economy   Table 2

Year	Share (%) of Agriculture in GDP	Agricultural Imports Share in		Agricultural Exports Share in	
		Level (US $ 000)	Total Imports (%)	Level (US $ 000)	Total Exports (%)
1967	N/A	36,187	6.2	17,996	2.7
1968	N/A	39,542	6.0	8,323	1.1
1969	N/A	49,680	8.3	5,405	0.4
1970	N/A	50,515	7.7	4,502	0.5
1971	N/A	75,766	10.3	5,586	0.8
1972	N/A	59,209	7.5	4,474	0.5
1973	N/A	45,489	5.6	11,791	1.0
1974	N/A	80,349	6.7	21,321	1.5
1975	N/A	71,181	5.2	10,375	1.2
1976	N/A	52,254	5.1	8,144	0.7
1977	14.9	48,829	4.6	12,287	1.2
1978	14.4	49,324	4.7	14,791	1.6
1979	13.3	61,942	5.0	4,394	0.3
1980	12.6	58,477	3.3	7,434	0.5
1981	14.5	69,165	4.3	7,217	0.6
1982	11.9	67,039	4.6	3,415	0.3
1983	11.5	N/A	N/A	N/A	N/A
1984	12.9	N/A	N/A	N/A	N/A

SOURCE: Jansen, D. Zambia: Political Economy of Agricultural Pricing. Draft 1986
Notes: N/A Not Available

3.3.1 Trade in agricultural products

As earlier mentioned, Zambia's agricultural exports have historically accounted for no more than 3 percent of total merchandise exports. (Table 2) The number of important agricultural exports is low but over the years since 1975 has increased slightly. Foreign exchange earnings from agricultural exports amounted to $15.9 million in 1985 and $17.1 million in 1986. These accounted for 3.7 percent and 3 percent respectively of total merchandize exports.[38] Three commodities, tobacco, cotton and sugar account for the bulk of agricultural export earnings. Agricultural exports may be classified into traditional and nontraditional exports. According to the World Bank, traditional exports include tobacco, confectionery groundnuts and day-old chicks. Nontraditional and potential exports include, cotton lint, coffee, eggs, fruits and vegetables, cashewnuts, sugar and tea.

Imports of agricultural products represents a very small part of the total use of foreign exchange for merchandise imports. For instance, in 1986, agricultural export products accounted for 5.4 percent of the value of total merchandize trade.[39] The major agricultural imports are wheat and wheat products, vegetable (edible) oils, dairy products, compound fertilizers, agro-chemicals, and agricultural machinery such as tractors and irrigation equipment. Some current agricultural imports may be considered for increased production as import substitutes[40] or

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[38] Ministry of Agriculture, Planning Division, International Trade Section, "Preliminary Study of Agricultural Exports From Zambia." Republic of Zambia 1989

[39] Food and Agricultural Organization, United Nations, Trade Yearbook. Rome 1987

[40] Import substitution refers to the increase in domestic production of

even a major effort for eventual exportation. These include wheat, veg-
etable oilseed crops like soybeans and even maize.

There is a significant amount of trade between Zambia and neighbour-
ing countries which is not always considered. Export commodities
include maize and maize meal, day old chicks, beef and groundnuts.
Exports to these countries are both formal and informal and may be paid
for in hard currency or in Zambian Kwacha or the currency of the import-
er. Another form of payment may be barter where only goods are traded
and no money changes hands.[41] The earning of hard currency is of course
most desirable but these other trade arrangements should not be ignored.
The informal trade often takes place because there are artificial barri-
ers to formal trade or artificial price differentials. In any case, the
informal trade should be encouraged to become formal through the removal
of trade distortions such as cumbersome administrative procedures.

This study is concerned with exports of cotton lint to the world
markets for hard currency and does not look closely at small-scale
exports of other agricultural commodities (formal or informal) to
neighbouring countries. This should not be interpreted as an indication
that these are not important. On the contrary, they may indicate the
beginning of a major export industry which should be encouraged and pro-
moted. Cotton production and lint exports would have the secondary and
important effect of import replacement through the by-product cotton
seed oil.

products normally imported in order to save foreign exchange.

[41] Based on discussions with Export Board of Zambia officials July,
1988.

TABLE 3

Zambia: Trade in Agricultural Products

	Imports (tonnes)				Exports (tonnes)			
Year	Wheat	Rice	Maize	Oilseed products	Maize	Tobacco	Cotton	g/nuts
1975	157,262	3,918	39	3,972	16,621	5,337	nil	2,880
1976	94,371	7,494	25	3,445	8,803	6,746	nil	2,715
1977	96,548	8,508	401	n/a	25,606	3,425	nil	1,781
1978	41,584	3,758	22	4,827	61,284	1,610	nil	2,500
1979	105,763	7,442	23,457	2,924	nil	1,632	3,200	501
1980	69,455	4,587	43,178	1,448	nil	6,992	3,750	431
1981	132,252	2,356	80,577	845	nil	986	2,500	430
1982	91,858	2,970	17	528	nil	1,078	925	165
1983	64,445	8,620	1,159	12,100*	nil	1,700*	7,000	nil
1984	78,681	1,058	1,437	13,000*	nil	1,526	8,000	nil
1985	72,003	9,600	1,300	11,000*	nil	2,100*	7,700	nil
1986	79,400	3,500	200	13,000*	nil	3,600*	4,170	n/a
1987	60,000	3,000	870*	15,000*	nil	5,600*	5,000	3,000

Sources:Republic of Zambia, Annual Agricultural Statistics 1983
       :FAO Trade Yearbooks various
Notes: n/a not available
       * unofficial figures
       g/nuts=groundnuts

3.4   STRUCTURE OF THE COTTON SUB-SECTOR

Cotton has been produced in Zambia since the 1950s. It has been grown on a significant scale since the mid 1960s but production started to accelerate around 1978/79. By 1983/84 production had trebled reaching 44,000 tonnes. The two varieties of cotton currently grown in Zambia are Chureza and Chilala which are of short to medium staple[42] length varieties. The two varieties are grown largely under rainfed conditions.

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[42] Staple length refers to cotton fiber length.

Although cotton is presently grown in seven provinces, three of these (Central, Southern, and Eastern) account for the major part of the production. The share of their total production over the period 1978/79 to 1983/84 accounted for 95 percent of the national production. Since then, there has been a spread in cotton production to other provinces (such as Northern, and North Western) which are considered not agronomically and economically suitable for cotton production because of their high rainfall, acidic soils and the long distances over which the crop has to be transported to the ginneries.

Initial cotton production was dominated by commercial farmers. However, since the early 1970s, the number of small-scale cotton producers has been increasing. Cotton is now predominantly a smallholder crop and this has a significant impact on rural living conditions in terms of employment provision and income generation. Smallholders currently account for 94 percent of the crop produced and marketed.[43]

There have been variations in cotton production but the the trend has been upwards since the late 1970s. Besides unfavourable growing conditions in some seasons, several factors have contributed to the variations in cotton production. These include:

(i)   the more attractive returns from other crops such as
      maize, which compete with cotton.
      This is more so among smallholder producers,
(ii) high labour requirements for cotton especially
      during picking, particularly among commercial farmers,
(iii) marketing arrangements which, until the formation

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[43] Lintco Annual Report 1986/87

of Lintco, were not reliable.

TABLE 4

Cotton Production in Zambia

Year	No. of growers	Area ha. Planted	Production (tonnes)
1964/65	2,046	2,388	2,272
1965/66	2,645	2,904	2,778
1966/67	2,634	2,386	1,831
1967/68	3,877	5,389	4,252
1968/69	5,208	5,336	6,916
1969/70	5,392	6,892	5,607
1970/71	7,225	13,388	11,823
1971/72	5,105	12,038	8,140
1972/73	3,849	8,662	5,160
1973/74	4,389	10,595	2,487
1974/75	4,201	8,040	2,560
1975/76	5,723	6,453	3,968
1976/77	10,152	10,509	8,929
1977/78	16,200	21,440	8,064
1978/79	16,107	21,454	14,979
1979/80	22,937	39,058	23,825
1980/81	21,215	38,395	16,928
1981/82	15,721	25,183	13,159
1982/83	23,253	34,237	32,085
1983/84	38,412	55,868	43,944
1984/85	38,421	54,758	30,275
1985/86	37,526	49,215	32,953
1986/87	32,236	38,158	20,174
1987/88	n/a	n/a	44,360
1988/89	n/a	n/a	63,954

Sources : Ministry of Agriculture, Statistics Bulletins Various
: Lintco Cotton Development Division
Notes: n/a not available

The Lint Company of Zambia (Lintco), which was formed in 1978, is the monopoly cotton marketing parastatal board with the following objectives:[44]

(i) to achieve national self-sufficiency in cotton so as to

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[44] Lintco, Annual Report, 1978/79

eliminate the importation of lint and cloth,

(ii) to achieve exportable surplus of lint to earn foreign

exchange for the country,

(iii) to improve the level of cotton growers by providing

input requirements and technical extension services.

Since Lintco's formation, production of cotton has been increasing over the years (Table 4). Several factors have led to the increase in cotton output in Zambia. These include: rapid increase in area under cultivation, increase in the number of growers, effectiveness of Lintco's marketing system (in particular, its rapid payment system), and introduction of a cotton interest-free credit scheme. Under this credit scheme, farmers get cotton inputs (seeds, sprayers and chemicals) on credit. These loans are then recovered at the time of marketing of produce. To boost production of cotton, Lintco also provides incentives to its extension staff such as readily available transport, and monetary rewards over and above their salaries.   Since 1983 Lintco has diversified into coffee and soybeans promotion among small scale producers, particularly in the high rainfall provinces of Northern, Luapula, Copperbelt and North Western and has yet to adjust to these added responsibilities.

Besides Lintco, some private commercial enterprises are investing in cotton production, particularly for export. These are The London Rhodesia (LonRho) Zambia Limited and the Gwembe Valley Development Company.[45] In its efforts to boost production, Lonrho has launched a tractor hire service to farmers and is also planning on going into direct production

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[45] Based on discussions with officials of the two companies and Lintco
   in July 1988.

of cotton. The Gwembe Valley Development Company, based in Southern province, has since 1987 embarked on large scale production of cotton under irrigation.

Problems that have hampered further increases in cotton production include:

(i) low yields;

Yields have not improved much over the years and have averaged between 650-900 kg per hectare. (Table 5) indicates average yield levels obtained in the cotton producing provinces. It should be noted that yields are much higher than these in some high cotton producing districts of central and southern provinces. Yields have not improved much due to the problems of poor weather in some years, insufficient crop management by farmers and ineffectiveness on the part of extension staff,

(ii) low participation from commercial farmers due to unattractive producer prices, and in part as a result of labour constraints.

TABLE 5

Zambia: Average Cotton Yields per Hectare

Province	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
Central	718	686	380	478	1062	930
C/belt	308	398	207	366	557	434
Southern	n/a	n/a	536	503	699	744
Eastern	569	551	389	469	677	660
Western	–	–	–	–	511	283
Northern	–	–	–	214	128	137
Luapula	–	–	–	259	167	197
N/Western	–	–	–	–	–	166
Zambia	689	610	441	523	937	787

Source: Lintco Cotton Development Division 1985
Notes: (1) n/a not available
       (2) – insignificant production
       (3) Figures are in Kgs per hectare

TABLE 6

Zambia: Lint Production, Domestic Sales and Exports

Financial Year	Lint Production	Domestic Lint b) sales*	Lint Exports
		(tonnes)	
1978/79	2919	2900	nil
1979/80	5566	2356	3200
1980/81	8483	3877	3750
1981/82	6254	3100	2500
1982/83	4865	3932	925
1983/84	11451	4425	7000
1984/85	16546	6080	8000
1985/86	11235	5062	7000
1986/87	8227	7588	4170

Source: Cotton Development Project Report 1987
Notes: b) does not include production and sales from Mumbwa
       Ginning Company
    * Domestic sales and exports may not add up due to
      carryover stocks

3.4.1 Cotton lint/seed relationship

Cotton plants produce two marketable products, fiber (lint) and cot-
tonseed. The cotton fiber is the more valuable component, representing
85 to 90 percent of the farm value of cotton.[46] The extraction rate for
lint from raw cotton in Zambia is estimated to be in the range of 36-38
percent.[47] The extraction rate or ginning percentage depend largely on
the variety of raw cotton and the condition of the ginneries. In gener-
al, there is an inverse relationship between staple and ginning percent-
age, both of which are supposed to increase returns to farmers through
higher prices, and higher yields.[48]

An important justification for choosing cotton for this study is the
fact that it is an important source of edible oil. This is particularly
so for Zambia which is facing shortages of edible oil. Cottonseed is
processed into oil, cakes or meal and hulls, all of which have commer-
cial value. One tonne (1,000kgs) of unprocessed cottonseed will yield
168 kgs of oil (17%), 468 kgs of meal (47%), 230 kgs of hulls (23%), 84
kgs of linters that is, the fuzz on the seed after ginning (8%), and 50
kgs manufacturing loss (5%).[49] As indicated in Figure 3, all four con-
stituent parts of cottonseed have commercial uses.

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[46] Kohls, N. Marketing of Agricultural Products. p550 1985

[47] Lintco Reports, 1988.

[48] Hutchings, J.A. "The Economics of Cotton Cultivation in India: Supply
and Demand for 1980-90" World Bank Staff Working Paper. No. 618.
pp5-6 1985

[49] Based on personal discussions with officials from the oil processing
industry, 1988.

Figure 3: Cotton Uses Flow Chart
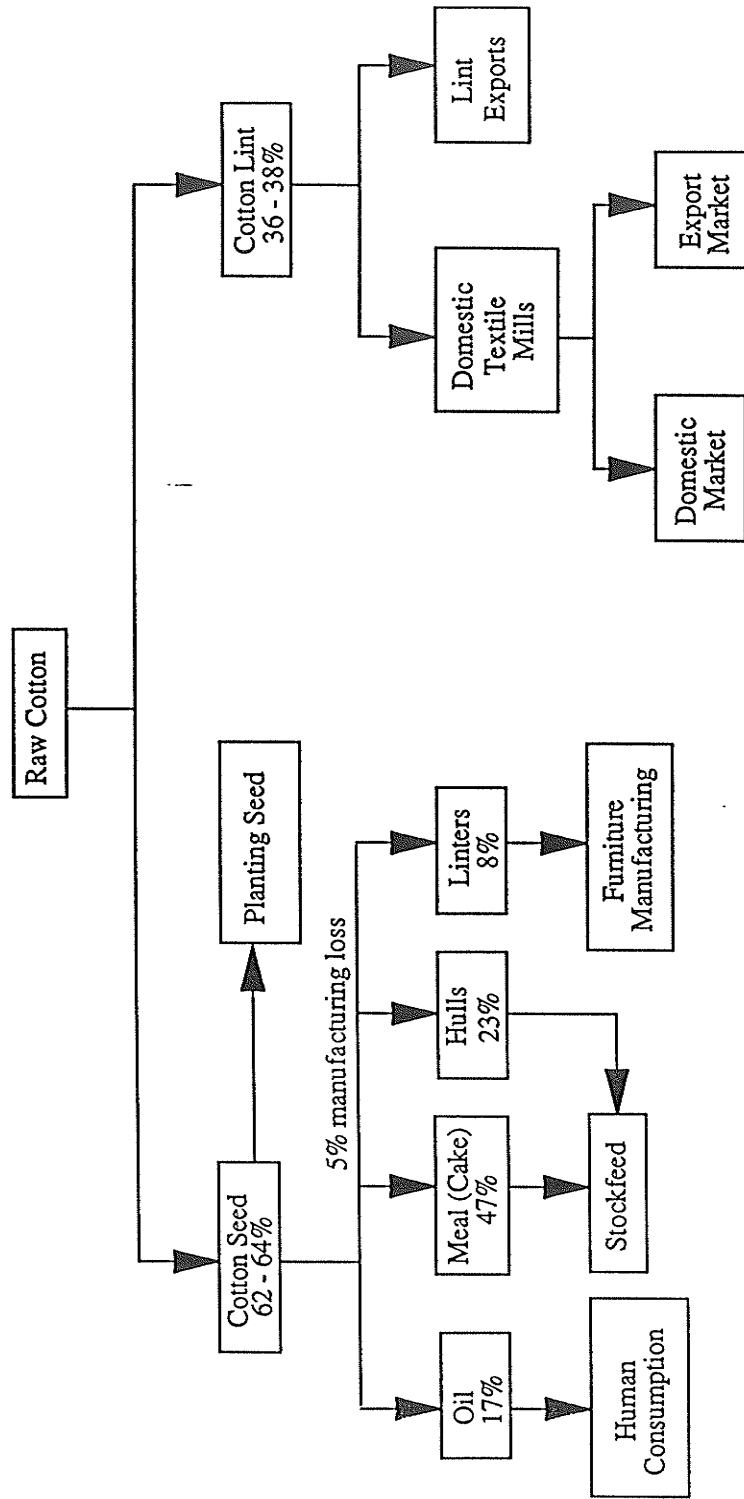
3.4.2 Edible oil production in Zambia

Zambia has an estimated demand for edible oil of about 31,000 tonnes per annum.[50] According to the Fourth National Development Plan, edible oil demand is estimated to increase to 50,000 tonnes during the Plan period (1989-93). This is largely attributed to population increase. The four major oilseeds produced are sunflower, soybeans, cottonseed and groundnuts. About 17,500 tonnes of edible oil per annum are currently produced by the processing industries. Of this, cottonseed contributes some 20 percent to domestic consumption of edible oil. However, this varies with yearly production of cotton in the country. These data imply a shortfall, at current production levels, of about 60,000 tonnes by 1993.

There has been a persistent shortfall of edible oil in the country which is mainly attributed to low production of oilseed crops. (Appendix B). Increased production of cotton would therefore contribute to alleviating this shortage. Currently, two plants process cotton seed into edible oil. These have a combined capacity of 30,000 tonnes of cotton seed per annum. This would yield 5,100 tonnes of oil at 17% oil extraction level. A ready market therefore exists for cotton seed edible oil as well as the other by-products.

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[50] Delloitte Haskins and Sells, "Study of the Oilseed Sector in Zambia." April 1987

Chapter IV

BASIC ECONOMIC FRAMEWORK

This chapter offers a description of the major components of market-
ing infrastructure and sets the stage for the analysis that follows in
the next chapter.

4.1   PRODUCTION

The two major categories of cotton and maize producers are smallhold-
er and small scale or emergent farmers. Smallholder and emergent farmers
cultivate an average of 0.25-10 hectares of cotton and maize and con-
tribute over 90 percent of the country's cotton production and 60 to 70
percent of maize production.   The classification of producers is based
on applied management, areas farmed and technology used. Emergent or
small-scale commercial producers are mostly found in central and south-
ern provinces.   This group depends on hired tractors for field opera-
tions, utilizes both family and hired labour and has hectarage ranging
from 5-10 under cotton.   Smallholder cotton producers mostly depend on
oxen technology and on simple hand tools for field operations.   These
are found in Eastern and other minor cotton producing provinces.   They
cultivate areas ranging from 0.25-5 hectares and mostly depend on family
labour.   There are a few large commercial cotton growers as well as one
private estate cotton grower but these account for less than 10 percent
of national cotton production.

4.2   MARKETING INFRASTRUCTURE

Lintco is the monopoly cotton marketing organization in Zambia. It is
charged with the responsibility of promoting cotton production through-
out the country, as well as purchase and sale of cotton output and
inputs. In order to perform its duties, Lintco has in place the market
infrastructure. Components of this infrastructure include a network of
depots through which cotton output is purchased and inputs are sold;
storage facilities; a number of ginneries; vehicles to transport both
output and inputs; and rural road network.

Lintco has both permanent and mobile buying depots. As of 1988, the
company had 410 permanent and 120 mobile depots.[51] Mobile services are
aimed at reducing transport costs to farmers as permanent depots may not
often be within easy reach. Lintco also owns and operates its own fleet
of trucks for inputs and output haulage which in 1988, numbered 35.
Small amounts of cotton are transported by rail. There are a total of
five ginneries in the country with annual throughput capacity of 103,515
tonnes of seed. (Table 7). The ginneries are located in major cotton
producing regions and supply cotton lint to four textiles mills with a
capacity of 14,700 tonnes of lint. The mills cater to local textile mar-
ket and occasionally export yarn and fabric to neighbouring countries.

Cotton seed is sold to two oil processing plants. The two oil mills,
one privately owned and one parastatal, have each a rated capacity of
15,000 tonnes of cotton seed. One of the oil mills has faced problems
of spares which in turn has contributed to it operating at a low capac-
ity of 57 percent.[52] This capacity is also low in comparison to the

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[51] Lintco, July 1988

TABLE 7

Cotton Ginning Capacity in Zambia 1988

Location of ginnery	Rated lint output per season (tonnes)	Equivalent seed cotton input per season (tonnes) *
Lusaka A	8,448	22,232
Lusaka B	8,712	22,926
Gwembe	8,712	22,926
Chipata	4,752	12,505
Mumbwa	8,712	22,926
Total Zambia	39,336	103,515

Source: Lintco Report 1987
Notes: * Assuming 38 percent ginning out turn i.e.
      seed cotton to lint conversion ratio

availability of cotton seeds.

Lintco has persistently faced problems of storing both cotton and inputs. At present the company has a few storage sheds and some some hard standings (concrete slabs) for storing both inputs and the cotton crop.

Officially, there are three grades of raw cotton set up by Lintco, namely: A, B, and C. Grading is visual and the grades are based on the colour of the cotton and amount of impurities. Once the seed cotton has been ginned it has to be classified. Cotton lint classification is based on fiber or staple length. Lint classification in Zambia is based on the U.S. standard of cotton classification.[53] Based on fiber length

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[52] Delloite Haskins and Sales, p18 1987.

[53] Based on discussions with an international cotton marketing special-
    ist from U.K. in August 1988.

and textile mill characteritics, there are 7 main classification of cotton lint. These are: good middling, strict middling, strict low middling, low middling, strict good ordinary, good ordinary and below grade. On the basis of these standards, Zambia's cotton is classified as follows: extra A, A, B, C, D, and E.[54] Initially, Lintco did not classify its cotton lint. This resulted in mixtures and poor quality product. However, since 1981, cotton classification has greatly improved with expert advice from Egypt, a major world cotton producer and exporter.

4.3 AGRICULTURAL PRICING ENVIRONMENT

Since the early 1970s, Zambia has followed a uniform, that is, pan territorial pricing policy for major agricultural commodities including fertilizers. The policy of uniform pricing whereby location of production, seasonal or location- specific supply and demand conditions are disregarded by maintaining a single unit price, has been an important aspect of the publicly administered price system. Because of government intervention in the pricing mechanism, calculation of relative prices of competing crops has to be done at prices that reflect the value of each. In addition to direct agricultural output price interventions, there are also other government policies that affect the relative prices of agricultural products. These include trade policy, namely the maintainance of an overvalued exchange rate through use of quantitative restrictions and tarrifs on imports. Further, trade in agricultural products is hampered by a maze of administraitive restrictions such as excessive documentation requirements.

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[54] Lintco July, 1988

The system of administered, pan-territorial pricing also applies to cotton. Producer prices for cotton are fixed by the Government on the basis of cost of production for two categories of farmers namely, small commercial and smallholder. Cotton lint sales prices are fixed by Lint-co on a cost-plus basis, permitting profit margins. The price of cotton seed to oil mills is also set on a cost-plus basis. This cost-plus sales pricing protects Lintco's financial integrity.

Comparison of regulated domestic cotton lint prices and f.o.b. export prices indicate that the domestic prices have consistently been above the export prices during five of the last seven years as indicated in Table 8. Reasons for domestic lint prices being higher than export prices may be attributed to a number of factors namely:
(i) relative overvaluation of the Kwacha prior
to the foreign exchange auction system of 1986/87 period,
(ii) a rise in Lintco's operating costs. Over the period
1980/81 to 1986/87, Lintco's handling, administration, and
financial costs rose by 290 percent, ginning costs by 240 percent,
and transport costs rose by 660
percent.[55]

As a result of domestic lint prices being higher than f.o.b. prices, Lintco made a Kwacha loss on lint exports, with Lintco receiving a subsidy from the government in the form of an export price differential. At exchange rates prevailing during the period, the subsidies were quite substantial: K4.65 million in 1980/81, K3.87 million in 1981/82 and

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[55]

Lintco, Cotton Development Report, 1987.

K0.53 million in 1982/83.[56] However, since 1984 the government has not provided export subsidies for cotton lint because of budgetary constraints.

TABLE 8

Ex ginnery lint prices and f.o.b. Lusaka prices

Year	F.o.b Lusaka price K/Kg(a) A Index	Domestic Ex ginnery price K/Kg
1980/81	1.00	2.14
1981/82	1.24	2.21
1982/83	2.36	2.50
1983/84	2.44	2.80
1984/85	2.08	3.10
1985/86	4.29	3.50/4.50*
1986/87	3.29	7.50/12.50*

Notes: (1) Calculated using average Liverpool A Index price less quality discount, freight handling (Lusaka-Liverpool), and merchant charges. Converted into Kwacha at average exchange rate during year.

(2) * Indicates price changes during year

Source: Lintco Cotton Development Report 1987

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[56] Ministry of Agriculture, Planning Division, Budget Section 1987.

4.4   DOMESTIC MARKET FOR COTTON LINT

Cotton lint is a major input into the domestic textiles mills and is thus an important   import substitute for imported textiles.   Domestic cotton lint consumption is currently estimated to be around 10,400 metric tonnes[57] There are four major domestic textile users of cotton lint which are involved in spinning,   weaving,   dying,   and printing of various yarns, fabrics and garments.   During most of the 1980s the country has achieved levels of cotton lint production sufficient for the domestic market as well as surpluses for export.   The textile industries have ventured into export of value added products such as yarn,   cloth and fabric,   mostly to neighbouring countries.   Small amounts of imports of textiles into the country have largely been for the high income segment of the population.

4.5   EXPORT MARKET FOR COTTON

Zambia has only been a consistent exporter of cotton lint during the last ten years.   For example, in 1986/87, 4,170 tonnes were exported and in 1988/89, 11,000 tonnes are estimated for export.[58]

Up until 1984, all cotton lint exports from Zambia were made directly by Lintco.   Recently,   other private companies have also been exporting cotton lint.   Cotton lint export is now largely done through one cotton merchant (Baumann-Hinde of U.K.).   The main final destinations of Zambia's cotton have largely been to western Europe. There has also been some barter trade in cotton between Zambia and some eastern European coun-

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[57] Lintco, Report 1989.

[58] Lintco, ibid. p4

tries.

We may conclude this chapter by noting that smallholder cotton pro-
ducers have potential to contribute to foreign exchange earning in the
agricultural sector.   However, if production and exports are to expand,
producers must have incentives such as attractive prices, adequate cred-
it and profitability better than the next alternative.   These factors
must generate favourable economic results at realistic exchange rates.

Chapter V

ASPECTS OF COTTON MARKETING INFRASTRUCTURE IN ZAMBIA

This chapter assesses the effectiveness of the marketing infrastructure for cotton. The chapter will also cover domestic marketing aspects including the financial viability of cotton to Lintco, implications for cotton export expansion, and areas for improvement.

In the past there has been a strong tendency for agricultural planners in developing countries to emphasize farm production without sufficient consideration of market infrastructure. Effective product marketing systems can reduce risks and lower costs for farmers and other market participants.[59] Further, investment in rural marketing infrastructure brings about improved response to price. There is need therefore to concern ourselves with the dynamic impacts that marketing infrastructure can have on production and consumption. This is so because relatively little effort has been made to better understand how effectiveness of marketing services influences supply functions, especially for small-scale farmers.

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[59] Riley, H.M. and Weber, M.T. op. cit. pp315-350 1983.

5.1   TRANSPORTATION AND STORAGE

Lintco's transport fleet of trucks for inputs and output delivery has not been adequate. As a result the company has resorted to hiring privately owned trucks for which it pays commercial rates. However, the poor state of feeder roads in certain major producing regions such as Gwembe valley in Southern province, discourage private truckers from hauling the cotton crop. Another problem faced by Lintco in hiring private transport is that preference is usually given to maize haulage over cotton by truckers who consider maize haulage to be more lucrative. The cost to Lintco of transporting cotton has escalated over the years. This has been due to increases in transportation rates, and also as a result of the large and shifting number of cotton producers who are scattered over large areas. Cotton transportation, with transport rates calculated on per tonne per kilometer basis, is particularly uneconomic for far away provinces such as Eastern, Luapula and Northern. Inadequate storage facilities for cotton reduce the quality and the uniformity of the lint.

5.2   COTTON PROCESSING FACILITIES

Cotton ginning capacity in the country outstrips present levels of cotton production. However, there are scale economies from the excess ginning capacity if production increases further. Given that Lintco has faced problems of disposing of cotton seed in the past, due to underutilization of the oil mills, consideration may have to be given to raising oil processing capacity through spares provision or establishing of more cotton seed processing plants. It is worth noting that the prob-

lem with refining imported crude oil is that the by product, cake is not available. Farmers and stockfeed manufacturing companies therefore lose this very valuable import subsitute for feeding livestock. While cotton quality is currently judged on the lint and not on oil content, it is desirable that plant breeders consider the oil content of the cotton seed as well as the lint producing properties.

5.3   COTTON GRADING AND CLASSIFICATION

While a three grade system exists in theory, it is not applied in practice since all the cotton is bought as grade A by Lintco.   This practice not only represents a very significant loss to Lintco but also does not provide the individual farmer with an incentive to improve his husbandry practices with a view to improving quality. There is some uncertainty as to whether Lintco's three grade system is appropriate for Zambia's present stage of cotton development. Hence there is need to reasses cotton grading requirements, to propose a practical scheme suit-able to Zambian conditions.   In contrast to the cotton grading situ-ation, Lintco has a relatively well established lint classification sys-tem.   Improvement in cotton lint classification standards implies that Zambia's lint is competitive by regional and international standards. It should be emphasized that improved quality for cotton at both farm and processing levels is vital to long-term viability of the industry.

5.4 FINANCIAL VIABILITY TO LINTCO

As pointed out earlier, Lintco is the monopoly parastatal company
charged with the responsibility of marketing and processing that is,
ginning cotton. It is therefore essential to assess the financial
viability to Lintco in carrying out the marketing and processing activi-
ties. This section therefore looks at how Lintco has fared financially.

TABLE 9

Lintco, Financial Profitability

Financial Year*	Profit Before Tax (K'000)	Profit After Tax (K'000)
1978/79	377.7	167.7
1979/80	1,072.4	547.9
1980/81	1,168.3	419.3
1981/82	1,230.5	535.5
1982/83	27.1	(32.0)
1983/84	2,546.0	1,603.0
1984/85	2,086.0	682.0
1985/86	(5,543.0)	(5,668.0)
1986/87	6,127.0	5,819.0
1987/88	N/A	N/A
1988/89	N/A	N/A

Notes: (1) Lintco's Financial Year is
           from 1st April to 31st March
       (2) ( ) Denotes negative profit or loss
Source: Lintco Annual Reports, Various years

This is done by assessing the trend of net financial profits. As indi-
cated in Table 9, Lintco has returned after tax profit every year except
for 1982/83 and 1985/86. Positive profits are largely attributed to
large gross profits from lint and cotton seed sales. The other major
business ventures of Lintco, notably soybeans and coffee have registered

financial losses during all of years above. The credit scheme in which
Lintco provides inputs to farmers without charging interest, and the
poor performance of the transport fleet, are factors that have contrib-
uted to the relatively high handling costs incurred by Lintco. The huge
loss in 1985/86 is a result of massive borrowing by the company to
finance its new ginnery in Southern Province, and losses from soybeans
and coffee ventures.

Major limitations in marketing infrastructure are ineffective grading
at farm level, lack of adequate storage, inadequate trucking facilities,
and low utilization of oil mill processing. There is excess ginning
capacity and cotton lint classification has improved. In order to
expand cotton production and exports, there is need to improve Lintco's
marketing infrastructure. Key areas requiring urgent attention are grad-
ing and storage of the crop. There is need to have clearly identified
grades for raw cotton together with sufficient price differentials to
provide grading incentives to growers. Transportation costs may be
reduced by concentrating ginneries near production. The government poli-
cy directive of loading Lintco with coffee and soybeans promotion has
been detrimental to the financial viability of Lintco. These ventures
should be removed from Lintco so that the company can concetrate on cot-
ton alone.

Chapter VI

EVALUATION OF PRICES AND PRICE RELATIONSHIPS

This chapter presents the analysis on prices and price relationships
of cotton and maize. This is done in order to determine whether the
price structure and pricing policy have favoured cotton production rela-
tive to its major competing crop, maize. The extent to which cotton pro-
duction is encouraged or discouraged by the pricing policy is estimated
using both prevailing official and border prices. The incentive and/or
disincentive effects of the pricing policy are analysed using nominal
protection coefficients. Because oil and meal are important by-products,
they also must be analyzed.

6.1 PRODUCER PRICING POLICY

The basic function of the producer pricing system is to translate
market values of products to agricultural producers. Producers in turn
respond to prices through relative profitabilitiy to determine what
crops to produce, and how much. Uniform pricing of crops and inputs, in
economic terms, is expected to lead to distortions of production and
inefficient markets because it negates inter and intra-regional compara-
tive advantage. World Bank studies have provided evidence of these con-
ditions.[60] In the case of Zambia, uniform pricing has encouraged the
production of maize and cotton in areas, some of which are remote and

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[60] Cleaver, K. "The Impact of Price and Exchange Rates on Agriculture in
Sub Saharan Africa." World Bank Staff Working Paper. No. 728 1985.

far from principal areas of consumption and processing facilities. For crops like cotton which has to be transported to a processing plant, this form of pricing is expected to generate market inefficiencies. Given Zambia's managerial capacity and the political objective of equity, uniform pricing may be the best option in that it is easy to administer. A major positive contribution of uniform pricing is that it has led to increased production of maize in former major decifit areas such as Northern province, thereby contributing to regional food self sufficiency. This argument cannot however be applied to cotton. Consequently, there are significant economic indications that uniform pricing policy works against efficiency in the cotton market and therefore implies limiting the capability to export.

6.2 RELATIVE COTTON/MAIZE PRODUCER PRICES

It is important to estimate price relationships among competing crops. This is so because rather than nominal prices of individual agricultural commodities, it is relative prices that influence the pattern of production, particularly for competing crops.[61]

In this section, comparisons are first made of the relative guaranteed maize/cotton prices which have prevailed under existing government pricing policy. Second, we assess the relative prices using border prices as the point of reference because they represent the opportunity cost of the traded commodities that is, they attempt to establish 'correct' price relations. Border prices are defined as foreign prices converted

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[61] Lele, U. "Comparative Advantage and Structural Transformation, A Review of African Economic Development Experience" in Ranis, G. and Schutz, P.L. (eds) The State of Development Economics. 1988

into a country's currency units by applying the official exchange rate.[62] Difficulties of using border prices include identifying appropriate border prices particularly when products are heterogeneous, and wide fluctuations in international prices which may make it difficult to select an appropriate trend price in real terms. Thus world prices, and hence border prices are not free trade prices in view of various distortions such as the presence of trade barriers. While border prices are not always and everywhere the most appropriate accounting prices to use, in general they do appear to capture the real opportunities open to countries through trade and thus provide a consistent reference point.

The ratios of the existing producer prices of cotton and maize are presented in Table 10. The relative prices of cotton and maize at the producer level remained fairly constant in the late 1960s, but declined in 1971-73, increased during 1974-78, and then declined sharply after 1979. In 1985 the relative price of cotton was only one third of what it was in 1978. The price of cotton has fared poorly with respect to the maize price. Since 1978, the price of maize has inceased considerably more than the prices of cotton and other crops. This reflects in part the high priority placed by government on the achievement of self sufficiency in maize.

In the last few years, there have been increases in official producer prices for most crops including cotton. These price increases have contributed to a rise in production of cotton and maize.

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[62] Scandizzo, P. and Bruce, C. op. cit. p3 1980

TABLE 10

Prevailing relative cotton/maize producer prices

| | RP(c) cotton/maize price | | Indices (1975=100) | |
| | | | cotton | maize |
Year	Pc/Pm	Index	price	price
1970	0.049	81.0	56.7	70.0
1971	0.043	70.8	56.7	80.0
1972	0.040	65.9	56.7	86.0
1973	0.040	65.9	56.7	86.0
1974	0.058	96.9	83.3	86.0
1975	0.060	100.0	100.0	100.0
1976	0.063	105.8	133.3	126.0
1977	0.063	105.8	133.3	126.0
1978	0.068	112.7	153.3	136.0
1979	0.051	85.2	153.3	180.0
1980	0.039	65.5	153.3	234.0
1981	0.034	56.8	153.3	270.0
1982	0.029	49.0	156.7	320.0
1983	0.028	47.4	173.3	366.0
1984	0.024	39.5	193.3	490.0
1985	0.024	39.4	223.3	566.4
1986	0.018	25.0	330.0	1100.0

Notes:
Pc = Guaranteed producer price, seed cotton, K/kg
Pm = Guaranteed producer price, maize K/90kgs, grade A
RP(c) = Relative Cotton/Maize Price (Pc/Pm)
Source: Ministry of Agriculture, Statistics Bulletins
Various.

Table 11 compares the relative prevailing producer prices at their border equivalent prices. The cotton border price (PbC), relative to the border price of maize, (PbM) is shown under the heading RP(c/m). It shows a similar cyclical relationship to the above. Cotton price rose in 1973 and declined since 1979. These strong changes may be attributed to large yearly variations, often in opposite directions, in the border prices of maize and cotton.

TABLE 11

Relative Cotton/Maize Border Prices

Year	Cotton Border Price K/Kg (PbC)	Maize Border Price K/90 Kg (PbM)	Cotton/Maize RP(c/m) (PbC/PbM)	Index
1970	0.21	8.16	0.03	50.6
1971	0.21	8.16	0.03	51.4
1972	0.23	6.94	0.03	64.9
1973	0.34	3.78	0.09	175.3
1974	0.39	6.82	0.06	113.6
1975	0.35	7.52	0.05	100.0
1976	0.48	8.02	0.06	124.5
1977	0.60	8.02	0.08	147.3
1978	0.64	12.83	0.08	156.9
1979	0.62	14.99	0.05	95.1
1980	0.40	20.46	0.03	53.1
1981	0.49	19.96	0.02	47.0
1982	0.50	21.78	0.03	49.6
1983	0.56	21.78	0.03	50.7
1984	1.04	27.90	0.04	73.5
1985	1.17	37.22	0.03	62.1

Notes:
RP(c/m)= PdC/PdM
where: PbC = Seed cotton border price, K/kg
       PbM = Maize cif import price, K/90 kg
Maize: Export parity prices for 1970-1978, all
       other years, import parity
Cotton: Import parity prices for lint, cotton seed
        oil and cake up to 1979. Thereafter, export
        parity for lint.
Source: Jansen, D. "A Comparative Study of the Political
Economy of Agricultural Pricing Policies: Zambia." 1986

COTTON: OFFICIAL AND BORDER PRODUCER PRICES
1977 TO 1985
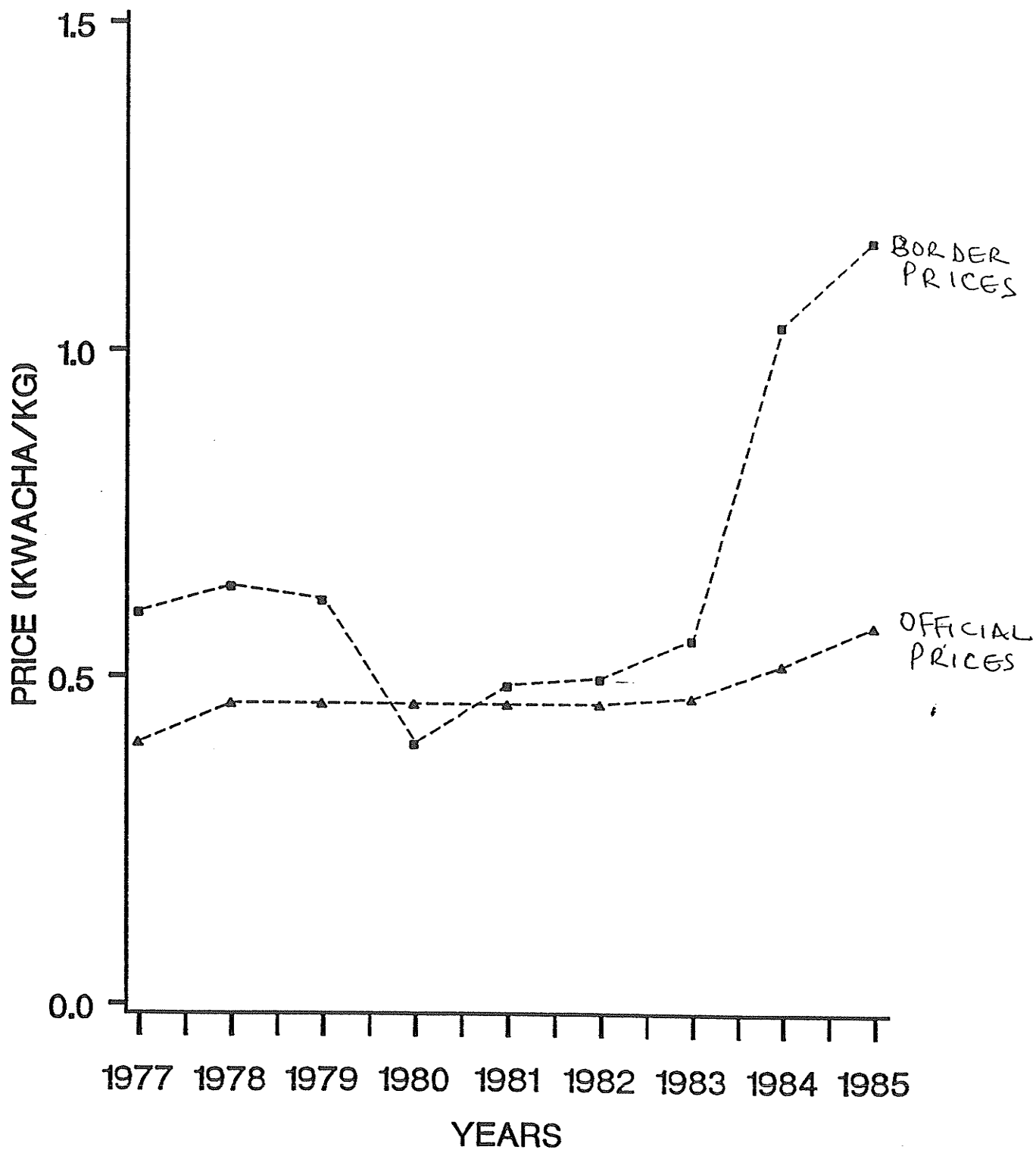
6.3 ESTIMATES OF NOMINAL PROTECTION COEFFICIENTS

The Nominal Protection coefficients compares prices received by farmers with the equivalent world (border) prices for that commodity.

$$NPC = Pd/Pw$$

Where: NPC = Nominal Protection coefficient

Pd = Official (farmgate) domestic price

Pw = world (border) price

Nominal protection coefficients may be expressed as pure ratios or as percentages. NPCs are sensitive to world price and to exchange rate changes. For example, a drop in world cotton lint prices and a devaluation of the Kwacha will result in the NPCs rising.

Comparison of border and official producer prices for both maize and cotton indicate that government set prices were below their border price equivalents. Both cotton and maize received negative protection that is, producers of the two crops were implicitly taxed by the pricing system during the 1970s and part of the 1980s. This indicates that although the government has continued to raise producer prices on an annual basis, these price increases have been below their world price equivalents, so that NPCs continued to fall. The negative protection coefficients for the two crops have major policy implications in terms of production performance. The implicit taxation of farmers would be expected to contribute to lowering domestic production and more import pressure

TABLE 12

Official and Border Prices and NPCs: Cotton & Maize

Harvest Year	Pwm	Pdm	NPCm (%)	Pwc	Pdc	NPC (%)
1970	8.16	3.50	(57.11)	0.21	0.17	(19.05)
1971	8.16	4.00	(50.98)	0.21	0.17	(19.05)
1972	6.94	4.30	(38.04)	0.23	0.17	(26.09)
1973	3.78	4.30	13.76	0.34	0.17	(50.0)
1974	6.82	4.30	(36.95)	0.39	0.25	(35.89)
1975	7.52	5.00	(33.51)	0.35	0.30	(14.28)
1976	8.02	6.30	(21.45)	0.47	0.40	(14.89)
1977	8.02	6.30	(21.45)	0.60	0.40	(33.33)
1978	12.83	6.80	(46.99)	0.64	0.46	(28.13)
1979	14.99	9.00	(39.96)	0.62	0.46	(25.81)
1980	20.46	11.70	(42.82)	0.40	0.46	15.00
1981	19.96	13.50	(32.36)	0.49	0.46	(6.12)
1982	21.78	16.00	(26.54)	0.50	0.47	(6.00)
1983	21.78	18.30	(15.98)	0.56	0.52	(7.14)
1984	27.90	24.50	(12.54)	1.04	0.58	(44.23)
1985	37.22	28.32	(23.91)	1.17	0.67	(42.74)

Notes ( ) denotes negative values
(1) Pwm= Border Price, maize K/90kg bag
(1a) Export parity for 1972, 1973, 1977 1978,
    All other years import parity
(1b) Pdm = Official market price, maize K/90kg bag
(1c) NPCm = Nominal Protection Coefficient, maize
(2) Pwc = Border price, cotton K/kg
(2a) Import parity for lint, cottonseed oil and
    cottonseed cake 1970 to 1978, thereafter, export
    price of lint
(2b) Pdc = domestic producer price K/kg
(2c) NPC = Nominal Protection coefficient, cotton
Source: Jansen, D. 1987 "Political Economy of Agricultural
    Pricing: Zambia." Draft 1986.
    Calculated by author

relative to zero or positive protection. This is also true of the policy

of maintaining the Kwacha at levels in excess of its real international

value.

Nominal protection coefficients provide a measure of the effect of government intervention on the prices received by farmers for their output. However, government policy often is designed to compensate producers for low farmgate prices by subsidies on inputs, e.g. fertilizers in Zambia. Effective protection coefficients (EPCs), are intended to capture the effect on output price as well as effects on prices paid for inputs, that is, effects on value added. Ideally these should be estimated in addition to NPCs and a comparison made between the two. This has not been done here due to inadequate data. However, EPCs would likely be higher than NPCs, but still less than one because input subsidies may not have a significant offsetting effect to the disincentives provided by output pricing policy. In addition, the fertilizer subsidies in Zambia are said to have benefited large commercial farmers and maize producers.

Three factors most influential in determining the relationship between domestic and f.o.b. lint prices are trends in world market prices, the exchange rate and local production and marketing costs. In the last few years the government has taken some steps to reform the producer pricing system. One of these has been the adoption of floor prices for most agricultural products except maize. Under this system producers are supposed to be free to negotiate prices above the floor. However, in reality, these floor prices become the effective prices.

In order to encourage production of export crops and all other commodities, a major policy step proposed in the Fourth National Development Plan (FNDP) (1989-90) is the introduction of seasonal and regional floor pricing systems. Seasonal prices are aimed at encouraging on-farm

storage while regional prices are aimed at encouraging regional special-
ization in the production of agricultural commodities. If properly
implemented, regional pricing may result in the reduction of transporta-
tion costs to marketing agencies.

The four price relationships considered in this chapter are: official
cotton and maize price, official and border price of cotton, border cot-
ton and maize price, and domestic and export price of lint. These price
relatives indicate that cotton fared badly in relation to maize in the
period 1970 to 1985. This implies that there is need for adjustment in
the relative prices in order to encourage export production. In addi-
tion, it is recommended that the producer price of cotton should be set
at levels that reflect the value of oil in the cotton seed. Currently,
the cost-of-production based prices do not compensate farmers for the
value of the oil in the seed.

Chapter VII

FINANCIAL AND ECONOMIC ANALYSIS OF COTTON PRODUCTION

This chapter presents the financial and economic analysis of small-
holder and small commercial cotton and maize producers. The financial
analysis determines the profitability of each category on the basis of
actual market prices and costs. Economic analysis on the other hand,
examines all costs and benefits from the point of view of society as a
whole. The results of an economic analysis give the relative resource
use efficiency in the production of cotton and maize by each category of
producers. Both the financial and economic analysis thus form a suffi-
cent condition for the production analysis.

7.1   DATA COLLECTION PROCEDURE

In order carry out the financial and economic analysis, data were
collected on various aspects of the cotton and maize crops. Data were
collected on technical and price coefficients, yield statistics, world
cotton prices, foreign exchange component of production and government
policies and pricing systems, including export trade policies. Collec-
tion of data was mainly from secondary sources including reports and
publications, personal interviews with relevant officials, and from
records of the relevant institutions - Lintco, the Ministry of Agricul-
ture and others. In the case of farm production budgets, reliance is
made on farm level survey data collected by the Planning Division of the

Ministry of Agriculture in conjuction with the Rural Development Studies
Bureau during the 1985/86 period.

It must be recognized that the problem of pricing inputs and outputs
in an economy being subjected to high domestic inflation and large cur-
rency devaluations is more difficult to deal with as time series data
are of limited use in such a situation. Updating production and price
data will provide a measure of the current situation in the country as
well as a base for future projections.[63]

7.2 EVALUATION CRITERIA

The evaluation criteria involve estimating relative profitability of
cotton and maize from the point of view of the farmer and the nation as
a whole. In the financial analysis, comparison is made of returns from
the two crops using a standard farm budgeting approach over a five year
period. Detailed financial and economic analysis will be done for the
1988/89 production period. This is considered a near-normal year given
high production levels (62 million Kgs of cotton and 13.2 million 90 kg
bags of maize). In addition, the year represents a period in which farm
survey data collected over the previous two production seasons was con-
solidated. The survey covered the whole country and focused on small-
holder and small commercial farm households. In the case of cotton,
detailed farm level data was collected from the three major cotton pro-
ducing regions; Eastern, Southern and Central. Variability of yields by
region especially those outside the major producing provinces, and by

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[63] Frank, D. "An Economic Analysis of Smallholder and Large Scale Mecha-
nized Wheat Production in Tanzania. Unpublished Msc Thesis Universi-
ty of Manitoba, 1989.

year is likely to be lost in surveys of this nature. Therefore, data
quality may not be representative of all cotton producers in the coun-
try.

In the economic analysis, estimates of profitability of cotton and
maize production, from the national point of view, and estimates of
resource use efficiency as measured by the resource cost ratio (RCR) are
made. Comparison of economic profitability and RCRs is made between cat-
egories of producers of one crop as well as between the two crops to
determine which one is the most effective in saving foreign exchange.
Comparison of relative efficiency of production activities is particu-
larly useful in determining categories that offer the greatest scope for
efficient expansion of commodity output.[64]

7.3   FINANCIAL COSTS OF CROP PRODUCTION

Financial analysis is required in order to assess the relative prof-
itability of cotton production at the farm level. Financial analysis
deals with costs and returns as faced by the individual. Financial anal-
ysis must indicate private profitability in order to induce individuals
to devote resources to the initiative. If a financial analysis does not
indicate the potential for profit, it is implied that private individu-
als will shift their resources to other uses. Thus, the initiative must
be both privately profitable and economically efficient to be justified
on economic grounds and to achieve the necessary support of private par-
ticipants. Naturally, private profitability does not assure economic

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[64] Page, J.M. and Stryker, J.D. "Comparative Advantage in Rice Produc-
tion: Methodology for Estimating Comparative Costs and Incentives"
Food Research Institute Studies. 1976.

rationality. For example, a high subsidy paid to producers will positively influence financial profitability but is simply a transfer in economic analysis. Similarly, an artificially high exchange rate may result in low financial profitability and encourage imports when when an economic exchange rate would produce both financial and economic rational production.

7.3.1 Variable Costs

Variable costs of cotton and maize production for the two categories of producers are given in tables on the following pages. Seed application and price are based on research station's and Lintco's recommendations. Insecticides application rates and prices are from agro-chemical companies and Lintco. Fuel, oil and lube are based on market prices prevailing during 1988/89 crop year. Labour costs are based on farm industry averages during the crop year. The total labour requirements for small commercial farms for farm operations (planting, weeding, fertilizer application, spraying, harvesting) is 125 days for cotton and 70 days for maize. For smallholder farms, farm operations are 107 days for maize and 165 days for cotton.[65] Crop haulage cost is based on the cost of transporting cotton bales from the farm to the nearest primary buying depot. Cost of packing material (wool packs) is based on Lintco which is the sole supplier. Seasonal interest is based on rates charged by lending institutions.

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[65] Jonsson, J. "Resource Guide Data in Agriculture" Republic of Zambia, Ministry of Agriculture. 1977.

7.3.2 Fixed costs

Depreciation is based on straight-line method of cost less salvage value of the life of the asset. Oxen are a unique type of asset as they do not depreciate over time. The interest charged to fixed assets represents an opportunity cost of capital for those assets. There is no charge for land rent under fixed costs. This is because under Zambian government policy, land has no value and cannot be bought or sold. The only allowable charge in land transaction is for developments to land. The opportunity cost of land is based on the cost of clearing one hectare of new land under the two scales of management. Costs of land development (clearing) were obtained from Land Development Services, a major land development company. Returns to management, family labour and capital can be considered the three residual claimants to farm income. Accounting for each of these three factors allows the analyst to determine if the operation being analyzed is providing a sufficient return to cover all three.[66]

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[66] Kay, R.D. Farm Management: Planning, Control and Implementation. Second Edition 1986 pp155-157

COTTON: SMALLHOLDER OXEN TECHNOLOGY PRODUCTION COSTS/HA : 1988/89   Table 13

INPUTS	CAPITAL INV./HA (1)	FOREX % BY ITEM (2)	COST/HA W/OUT. SUB. (3)	DOMESTIC COST W/OUT SUB (4)	FOREX COST W/OUT SUB (5)	ECON. FOREX COST (6)	TOTAL ECON. COST (7)
OXEN	855.00	10	855.00	769.50	85.50	132.53	902.02
MACHINERY	411.00	80	441.00	82.20	328.80	509.64	591.84
LAND CLEARING	1,500.00	80	1500.00	300.00	1,200.00	1,860.00	2,160.00
TOTAL INVESTMENT	2,766.00		2,766.00	1,151.70	1,614.30	2,502.16	3,653.86
VARIABLE COST:							
SEED	45.00	40	45.00	27.00	18.00	27.90	54.90
INSECTICIDE	446.43	80	446.43	89.29	357.14	553.57	642.86
LABOUR	1,300.00	10	1,300.00	1,170.00	130.00	201.50	1,371.50
OXEN DEATH LOSS	72.00	00	72.00	72.00	0.00	0.00	72.00
DIPPING OF OXEN	36.00	75	36.00	9.00	27.00	41.85	50.85
MACHINERY REP.	18.56	10	18.56	16.70	1.86	2.88	19.58
HAULING OF COTTON	60.00	75	60.80	15.00	45.00	69.75	84.75
PACKING MATERIAL	27.84	60	60.00	24.00	36.00	55.80	79.80
CONTINGENCY	29.97	00	27.84	27.84	0.00	14.30	42.14
SUB TOTAL	2,035.80		2,065.83	1,450.83	615.00	967.55	2,418.38
SEASONAL INTEREST	263.43	00	309.87	257.23	0.00	145.13	362.76
TOTAL VARIABLE COSTS	2,299.23		2,375.70	1,708.06	615.00	1,112.68	2,781.14
FIXED COSTS:							
DEPRECIATION:							
MACHINERY	19.80	80	19.80	3.96	15.84	24.55	28.51
INTEREST:							
MACHINERY	60.77		60.77	60.77	0.00	0.00	60.77
LAND & BLDS	120.20		120.00	120.00	0.00	0.00	120.00
SUB TOTAL	200.00		200.00	184.73	15.84	24.55	209.28
MANAGEMENT ALLOWANCE	124.99		128.81	94.64	31.54	56.86	149.52
TOTAL FIXED COSTS	325.56		329.38	279.37	47.38	81.41	358.80
TOTAL COSTS	2,624.79		2,705.09	1,987.43	662.38	1,194.09	3,139.94

Source: (1) Ministry of Agriculture
       (2) World Bank Zambia: Policy Options for Agricultural Growth, 1984
       (3) to (7) Calculated by author

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COTTON: SMALL COMMERCIAL FARMS PRODUCTION COSTS/HA : 1988/89   Table 14

INPUTS	CAPITAL INV./HA (1)	FOREX % BY ITEM (2)	COST/HA W/OUT. SUB. (3)	DOMESTIC COST W/OUT SUB (4)	FOREX COST W/OUT SUB (5)	ECON. FOREX COST (6)	TOTAL ECON. COST (7)
MACHINERY	7,951.00	80	7,951.00	1,590.20	6,360.80	9,859.24	11,449.44
BUILDINGS	240.00	35	240.00	156.00	84.00	130.20	286.20
LAND CLEARING	1,500.00	80	1,500.00	300.00	1,200.00	1,860.00	2,160.00
TOTAL INVESTMENT	9,691.00		9,691.00	2,046.20	7,644.80	11,849.44	13,895.64
VARIABLE COST:							
SEED	21.41	40	21.41	12.85	8.56	13.27	26.12
COMP D FERT.	88.86	80	111.07	22.21	88.86	137.73	159.94
INSECTICIDE	325.00	80	325.00	65.00	260.00	403.00	468.00
LABOUR	1,872.72	10	1,872.72	1,685.45	187.27	290.27	1,975.72
FUEL + OIL & LUB	264.96	84	264.96	42.39	222.57	344.98	387.37
MACHINERY REP.	419.99	75	419.99	105.00	314.99	488.24	593.24
BUILDINGS REP.	16.80	10	16.80	15.12	1.68	2.60	17.72
PACKING MATERIAL	34.80	60	34.80	13.92	20.88	32.36	46.28
CONTINGENCY	45.67	00	46.00	29.43	16.57	25.69	55.12
SUB TOTAL	3,090.21		3111.75	1,991.38	1,121.38	1,738.14	3,729.51
SEASONAL INTEREST	463.53	00	466.91	298.71	168.21	260.72	559.43
TOTAL VARIABLE COSTS	3,553.74		3,579.66	2,290.07	1,289.59	1,998.87	4,288.94
FIXED COSTS:							
DEPRECIATION:							
MACHINERY	447.99	80	447.99	89.60	358.39	555.51	646.11
BUILDINGS	12.00	10	12.00	10.80	1.20	1.86	12.66
INTEREST:							
MACHINERY	381.65		381.65	381.65	381.65	591.56	973.21
LAND & BLDS	139.20		139.20	139.20	139.20	215.76	354.96
SUB TOTAL	980.84		980.84	621.25	880.44	1,364.69	1,985.93
MANAGEMENT ALLOWANCE	226.73		228.03	145.57	108.50	168.18	313.74
TOTAL FIXED COSTS	1,207.57		1,208.87	766.81	988.94	1,532.86	2,299.68
TOTAL COSTS	4,761.31		4,788.53	3,056.89	2,278.53	3,531.73	6,588.62

Source: (1) Ministry of Agriculture, 1988
        (2) World Bank Zambia: Policy Options for Agricultural Growth, 1984
        (3) to (7) Calculated by author

MAIZE: OXEN TECHNOLOGY (EMERGENT) FARMS, PRODUCTION COSTS/HA : 1988/89 Table 15

INPUTS	CAPITAL INV./HA (1)	FOREX % BY ITEM (2)	COST/HA W/OUT. SUB. (3)	DOMESTIC COST W/OUT SUB (4)	FOREX COST W/OUT SUB (5)	ECON. FOREX COST (6)	TOTAL ECON. COST (7)
OXEN	969.00	10	969.00	872.10	96.90	150.19	1,022.29
MACHINERY	888.00	80	888.00	177.60	710.40	1,101.12	1,278.72
LAND CLEARING	1,500.00	80	1,500.00	300.00	1,200.00	1,860.00	2,160.00
TOTAL INVESTMENT	3,357.00		3,357.00	1,349.70	2,007.30	3,111.32	4,461.01
VARIABLE COST:							
SEED	164.60	40	164.60	98.76	65.84	102.05	200.81
COMP D FERT.	246.25	80	258.56	51.71	206.85	320.61	372.33
UREA	178.75	80	187.69	37.54	150.15	232.74	270.27
CHEMICALS:							
RIPCORD	124.27	80	124.27	24.85	99.42	154.09	178.95
LABOUR	964.16	10	946.16	851.54	94.62	146.65	998.20
OXEN DEATH LOSS	77.55	00	77.55	77.55	0.00	0.00	77.55
DIPPING OF OXEN	33.93	75	33.93	8.48	25.45	39.44	47.93
MACHINERY REP.	42.11	75	42.11	10.53	31.58	48.95	59.48
HAULING OF FERT.	5.70	75	5.70	1.43	4.28	6.63	8.05
HAULING OF MAIZE	28.50	75	28.50	7.13	21.38	33.13	40.26
PACKING MATERIAL	58.00	60	58.00	23.20	34.80	53.94	77.14
CONTINGENCY	28.86	00	28.91	17.89	11.02	17.07	34.96
SUB TOTAL	1,952.68		1,955.98	1,210.61	745.37	1,155.32	2,365.93
SEASONAL INTEREST	292.90	00	293.40	181.59	111.81	173.30	354.89
TOTAL VARIABLE COSTS	2,245.58		2,249.37	1,392.20	857.17	1,328.62	2,720.82
FIXED COSTS:							
DEPRECIATION:							
MACHINERY	44.02	80	44.02	8.80	35.22	54.58	63.39
INTEREST:							
MACHINERY	89.14	00	89.14	89.14	0.00	0.00	89.14
LAND & BLDS	120.00	00	120.00	120.00	0.00	0.00	120.00
SUB TOTAL	253.16		253.16	217.94	35.22	54.58	272.53
MANAGEMENT ALLOWANCE	124.94		125.13	80.51	44.62	69.16	149.67
TOTAL FIXED COSTS	378.10		378.29	298.45	79.84	123.74	422.20
TOTAL COSTS	2,623.68		2,627.66	1,690.65	937.01	1,452.36	3,143.01

Source: (1) Ministry of Agriculture, Lusaka, Zambia
(2) World Bank, Zambia: Policy Options for Agricultural Growth, 1984
(3) to (7) Calculated by author

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MAIZE: SMALL COMMERCIAL FARMS, PRODUCTION COSTS/HA : 1988/89   Table 16

INPUTS	CAPITAL INV./HA (1)	FOREX % BY ITEM (2)	COST/HA W/OUT. SUB. (3)	DOMESTIC COST W/OUT SUB (4)	FOREX COST W/OUT SUB (5)	ECON. FOREX COST (6)	TOTAL ECON. COST (7)
MACHINERY	9,041.00	80	9,041.00	1,808.20	7,232.80	11,210.84	13,019.04
BUILDINGS	240.00	35	240.00	156.00	84.00	130.20	286.20
LAND CLEARING	1,500.00	80	1,500.00	300.00	1,200.00	1,860.00	2,160.00
TOTAL INVESTMENT	10,781.00		10,781.00	2,264.20	8,516.80	13,201.44	15,465.24
VARIABLE COST:							
SEED	230.19	40	230.19	138.11	92.08	142.72	280.83
COMP D FERT.	492.50	80	615.63	123.12	492.50	763.38	886.50
UREA	286.00	80	357.50	71.50	286.00	443.30	514.80
CHEMICALS:							
PRIMAGRAM	348.00	80	348.00	69.60	278.40	431.52	501.12
ALDRIN	172.50	80	172.00	34.40	137.60	213.28	247.68
LABOUR	726.80	10	726.80	686.52	76.28	118.23	804.75
FUEL + OIL & LUB	235.15	84	235.15	37.62	197.53	306.17	343.79
MACHINERY REP.	453.50	75	453.50	113.38	340.13	527.19	640.57
BUILDINGS REP.	16.88	10	16.88	15.19	1.69	2.62	17.81
INSURANCE	388.91	10	388.91	350.02	38.89	60.28	410.30
HAULING	16.50	75	16.50	4.13	12.38	19.18	23.31
PACKING MATERIAL	116.00	60	116.00	46.40	69.60	107.88	154.28
CONTINGENCY	52.25	00	55.70	25.35	30.35	47.04	72.39
SUB TOTAL	3,535.18		3,768.75	1,715.34	2,053.41	3,182.78	4,898.12
SEASONAL INTEREST	530.28	00	565.31	257.30	308.01	477.42	734.72
TOTAL VARIABLE COSTS	4,065.46		4,334.06	1,972.65	2,361.42	3,660.20	5,632.84
FIXED COSTS:							
DEPRECIATION:							
MACHINERY	483.73	80	483.73	96.75	386.98	599.83	696.57
BUILDINGS	12.00	10	12.00	10.80	1.20	1.86	12.66
INTEREST:							
MACHINERY	433.95	00	433.95	433.95	0.00	0.00	433.95
LAND & BLDS	139.20	00	139.20	139.20	0.00	0.00	139.20
SUB TOTAL	1,068.88		1,068.88	680.70	388.44	601.69	1,282.38
MANAGEMENT ALLOWANCE	256.72		270.15	132.67	137.48	213.09	345.76
TOTAL FIXED COSTS	1,325.60		1,339.03	813.36	525.66	814.78	1,628.14
TOTAL COSTS	5,391.05		5,673.09	2,786.01	2,887.08	4,474.98	7,260.99

Source: (1) Ministry of Agriculture
(2) World Bank, Zambia: Policy Options for Agricultural Growth 1984
(3) to (7) Calculated by author

Tables 13 to 16 indicate economic costs of production for smallholder and emergent cotton and maize farmers. The input and cost estimates are on per hectare basis. Foreign exchange percentage components are based on World Bank estimates. According to Hansen (1978), it is reasonable to assume a constant foreign exchange content for any output, especially when the inputs and outputs are tradeable. The foreign exchange cost of each input was derived by multiplying the foreign exchange percentage by the cost per hectare for each input. The result is the foreign exchange component in Kwacha. Small-scale cotton farmers are subsidized in the price of fertilizer. Column 4 in both budgets represents cost per hectare without subsidy. Estimates were made on the fertilizer subsidy using Ministry of Agriculture data. The difference between column 7 and 4 represents the estimated subsidy a particular category received per hectare.

7.4   ECONOMIC ANALYSIS

In contrast to financial analysis, economic analysis requires revaluation of financial expenses and cash receipts at their true economic value. The financial analysis may be considered a base for economic analysis.[67] Economic analysis provides a broader aspect of the benefits and costs to the entire economy. The purpose of determining economic values is to adjust the financial prices of tangible items to reflect the costs to the economy as a whole. Major items to be adjusted in the financial analysis include direct transfer payments, such as subsidies,

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[67] Gittinger, J.P. Economic Analysis of Agricultural Projects. 1982. pp395-398

and price distortions in traded and nontraded goods. These adjustments lead to a set of economic accounts in which all values are stated in 'efficiency prices' and reflect real resource use.[68]

7.4.1   Estimation of shadow exchange rate

In order to convert input financial values to their economic values, we have to use the shadow price of foreign exchange. A shadow price is defined as that price which would prevail in the economy if it were in equilibrium under conditions of perfect competition.[69] Estimation of shadow exchange rate is therefore a critical step in economic analysis.

Until the early 1970s, the exchange rate between the Kwacha and the US dollar (and other major currencies) appears to have been roughly in equilibrium at K0.714 per U.S. dollar.[70] But there are suggestions that the actual exchange rate diverged from the equilibrium rate during the 1970s and early 1980s. The evidence to this effect includes growing current account deficits, import bans, strict import licensing, payment arrears, debt rescheduling, and during the 1985/87, lower auction-determined rate, and the divergence between the official and 'parallel' market rate. Given this scenario, one cannot therefore use the official exchange rate to convert input financial values to their economic values. Hence the need to use a shadow exchange rate.

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[68] Gittinger, J.P.   ibid pp250-270 1982

[69] ibid   op. cit. p39 1982

[70] Jansen, D.   "Political Economy of Agricultural Pricing: Zambia" p34
1986.

TABLE 17

Official Exchange Rates and CPIs: Zambia and U.S.

Year	CPI Zambia 1985=100	CPI U.S. 1985=100	Official Exchange Rate US $/Kwacha
1970	13.8	36.3	1.40
1971	14.6	37.6	1.40
1972	15.4	38.9	1.40
1973	16.4	41.4	1.56
1974	17.7	45.9	1.56
1975	19.5	50.0	1.56
1976	23.2	52.9	1.26
1977	27.7	56.4	1.31
1978	32.3	66.7	1.27
1979	35.4	67.5	1.28
1980	39.5	76.6	1.24
1981	45.1	84.6	1.13
1982	50.7	89.7	1.08
1983	60.6	92.6	0.66
1984	72.8	96.6	0.45
1985	100.0	100.0	0.18
1986	151.6	101.9	0.07
1987	216.9	105.7	0.13
1988	337.8	109.9	0.10

Source: IMF International Financial Statistics,
1975, 1980, 1988 issues.

Three methods used in estimating shadow prices of foreign exchange rates are:

1. one based on purchasing power parity theory. The purchasing power parity between two countries is defined as either the ratio of the countries' price levels, or the product of the exchange rate in a base period and the ratio of the countries' price indices.[71]

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[71] Officer, L.H. 'The Purchasing Power Parity Theory of Exchange Rates: A Review Article' IMF Staff Papers. (23) 1976. p2

2. using the 'black' or parallel market rate as a proxy for shadow exchange rate. The 'black' market rate is said to be indicative of the willingness to pay for traded goods, given the large gap between supply and demand for foreign exchange in a country like Zambia. Between 1987 and (1989) the 'black' market exchange rate is estimated to have ranged between K20.00-K40.00 per one US dollar (based on unofficial estimates). The difficult with this measure is that there usually are not reliable measures and what information is available is for limited transactions.

3. using world (border) prices as shadow prices.[72] According to Little and Mirrlees (p68), border prices can be used for traded goods, because they represent the current social opportunity costs or benefits of using or producing a traded good.

The approach used in this study is one based on purchasing power parity and involves estimating the shadow exchange rate using the CPI of Zambia and the U.S. Ideally, we should be using weighted price indices of Zambia's major trading partners. The shadow exchange rate used in the economic analysis is the estimated real effective exchange rate. This is defined as the ratio of the change of the consumer price index of Zambia to that of the U.S. multiplied by the nominal exchange rate.

$$REER=En*(changeCPIz)/(change CPIus)$$

Where:

REER=Real effective exchange rate

En=Nominal exchange rate

CPIz=Consumer price index, Zambia

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[72] Little, I.M.D. and Mirlees, J.A. Project Appraisal in Developing Countries. 1978

CPIus=Consumer price index U.S.

From the estimation, we get a shadow price of foreign exchange in purchasing power parity terms of K12.74 per U.S. dollar or US$ 0.0785 per one Zambian Kwacha for 1988. Dividing the shadow exchange rate by the nominal exchange rate, we obtain a foreign exchange premium of 1.55. (Appendix A). This gives a lower rate than the 'black' market rate but that is to be expected because of foreign exchange supply restrictions and the risk associated with the parallel market for foreign exchange. This estimated shadow exchange rate is used in economic analysis. However, in order to capture exchange rate changes, sensitivity analysis will be done.

7.5   EVALUATION OF PROFITABILITY OF CROP PRODUCTION

Results of the financial and economic profitability from cotton and maize production are presented in this section. The purpose of the financial and economic analyses is to determine whether it is profitable to produce cotton relative to maize, from the farmers' and nation's point of view. In order to show this, the following steps are taken; estimates are made of gross returns from the two crops, financial and economic profitability and resource use efficiency estimates as indicated by the resource cost ratio, are made.

7.5.1   Results of Financial Analysis

Table 18 gives a comparison of the gross returns from cotton and maize for the production period 1984/85 to 1988/89, for the two catego-

ries of producers. Estimates indicate that at existing yield levels, gross revenue from cotton production did not much more than cover variable costs. Gross margins for cotton between 1984/85 and 1986/87 are persistently less than those from maize. This may be attributed to low producer prices of cotton relative to maize, high cotton input prices (notably, insecticide), low cotton yields as a result of poor weather in some years and low management practices. However, gross returns from cotton production are higher than those for maize in the 1987/88 production year. This is a result of large increases in the cotton producer prices compared to maize during that year. For instance, during the 1987/88 season, the producer price for cotton was increased by 90 percent compared to only 2.5 percent for maize.

TABLE 18

Gross Returns: Maize and Cotton, Small-scale Farms, 1984/85 to 1987/88

	Cotton (improved small-scale)			Maize (improved oxen technology)		
	(1) Total Variable Costs (K/ha)	(2) Revenue (K/ha)	(3) Gross Margin (K/ha)	(4) Total Variable Costs (K/ha)	(5) Revenue (K/ha)	(6) Gross Margin (K/ha)
Season						
1987/88	2067.37	2700.00	632.63	1642.37	2000.00	357.63
1986/87	1913.90	2185.00	271.10	1954.28	2730.00	775.72
1985/86	999.50	1138.50	138.86	1203.94	1925.00	721.06
1984/85	770.50	770.50	50.36	667.48	992.25	324.77

Notes:
(1), (3) : Total variable costs of production during production season
(2), (5) : Yield level * Recommended producer price
(3), (6) : Gross revenue less Total variable costs
Source: (1), (4) Ministry of Agriculture, Planning Division, and
        Calculated by author

TABLE 19

Cotton: Results of Financial Analysis, 1988/89

Item	Smallholder (Oxen)	Small Commercial
Yield (Kgs/ha)	750.00	900.00
Producer price (K/kg)	3.60	3.60
Revenue (K)	2,700.00	3,240.00
Capital Investment (K)	1,911.00	9,691.00
Variable costs (K)	2,379.23	2,619.01
Fixed costs (K)	309.76	1,160.84
Total prodn costs (K)	2,688.99	3,779.85
Gross margin (K)	320.77	620.99
Profit (NFP) (K)	11.01	(539.85)

Notes: Author's calculation from Tables 13 and 14
       NFP Net Financial Profit
       ( ) indicates negative values

TABLE 20

Maize: Results of Financial Analysis, 1988/89

Item	Smallholder (oxen)	Small Commercial
Yield 90kg bags/ha	25.00	50.00
Producer price K/90 kg bag	108.00	108.00
Revenue (K)	2,700.00	5,400.00
Capital investment (K)	2,388.00	10,781.00
Variable costs (K)	2,172.35	4,065.90
Fixed costs (K)	330.46	1,325.62
Total Prodn costs (K)	2,502.81	5,391.52
Gross margin (K)	527.65	1,334.10
Profit (NFP) (K)	197.19	8.48

Source: Author's calculation from Tables 15 and 16

Table 19 and 20 presents a summary of the results of the financial analysis for 1988/89. Results indicate that profit per hectare for smallholder cotton producers is positive while it is negative for small commercial cotton producers. This is a result of higher total costs of production (mostly fixed costs) for the latter compared to the former. The lower production costs for smallholder farms are due to less capital investment per hectare which results in lower fixed costs. Gross returns for small commercial cotton farms are however, positive and almost double those of smallholder farmers. This is attributed to higher yields for small commercial farmers.

Comparison of the relative profitability of cotton and maize indicate that net financial profit for both smallholder and small commercial farmers for maize are higher than those of cotton producers. Maize is thus financially more profitable than cotton, particularly for smallholder oxen farms.

It has been pointed out earlier that the pricing policy has led to producer prices of cotton faring poorly relative to those of maize. Further, the cost-of-production based prices do not reflect the value of oil in the important byproduct, cotton seed. It is therefore important to address what the financial analysis of cotton would look like at 'correct' prices that is, prices that may compensate cotton producers for the byproduct cottonseed and approximate world price equivalents for the 1988/89 season. Producer prices are varied from K4.00 to K7.00 per kg while yields and total production costs are held at their base levels. Results indicate that the net financial profitability of cotton improves for both categories at prices above K4.00 per kg. This would

TABLE 21

Cotton:Financial Analysis at Various Producer Prices

1988/89

Producer Price (K/kg)	Net Financial Profitability K/Ha	
	Oxen technology	Small commercial farms
4.00	311.01	(179.85)
5.00	1,061.01	720.15
6.00	1,811.01	1,620.15
7.00	2,561.01	2,520.15

Notes: ( ) denotes negative values
Source: Calculated by author

seem to indicate that producer prices for cotton during 1988/89 should have been above the official level of K3.60 per kg, possibly around world parity at K7.19 per Kg. Hence it may be concluded that the producer price of cotton ought to compensate farmers for the value of the byproduct cottonseed.

7.5.2 Results of Economic Analysis

Results of the economic analysis for cotton are given in Table 22 below. The net economic profitability of cotton oxen technology farmers per hectare is positive while it is negative for small commercial farms. This result is similar to that of the financial analysis.

Estimates of comparative advantage are indicated by the resource cost ratios. There are many ways of estimating resouce cost ratios. However, in this study the resource cost ratios are obtained by dividing total

TABLE 22

Cotton: Results of Economic Analysis 1988/89

```
-----------------------------------------------------------
Item                   Oxen technology    Small Commercial
-------                ---------------     ----------------
Yield Kg/ha                 750.00               900.00
Producer price K/Kg          K7.19                K7.19
Revenue                  K5,393.50            K6,471.00
Capital Investment       K3,653.86           K13,895.64
Variable Costs           K2,764.69            K4,288.94
Fixed Costs                K357.98            K2,299.68
Total Costs              K3,122.67            K6,588.62
Profit    K/ha           K2,270.83             (117.62)
Forex cost K/ha          K1,194.09            K3,531.73
Resource Cost Ratio          0.58                 1.01
-----------------------------------------------------------
```
Notes: 1) Calculated by author from Tables 13 and 14
       2) f.o.b. Lusaka cotton lint price of
          57 cents/lb. This price is adjusted to
          producer price equivalent using the estimated
          shadow exchange rate.

economic costs by total revenue. The RCR for smallholder oxen technology

farmers is less than unity while it is about unity for small commercial

farms. This indicates that oxen technology producers are efficient sav-

ers of foreign exchange through local production of cotton while small

commercial farmers are inefficient.

Using another approach to estimate DRCs that is, taking the ratio of

unsubsidized domestic costs and the difference between revenue and eco-

nomic foreign exchange costs gives estimates of DRCs of 0.47 for small-

holder oxen cotton producers and 1.04 for small commercial cotton

farms. These results are consistent with those in Table 22 and indicate

that smallholder oxen cotton producers are still more efficient than

small commerical farmers.

The above results are in contrast to World Bank estimates of 1984 which indicated that the only efficient producers of cotton were commercial farmers, while smallholder farmers were marginally efficient. However, World Bank estimates of DRCs were based on market prices and official exchange rate existing in 1983 of US $1 to K1.40. In this study, market prices and costs are adjusted by the estimated shadow exchange rate. The steps for converting the financial accounts to an economic basis are:[73] (i) adjustment for direct transfer payments. A major transfer payment from government to producers in Zambia is subsidies on fertilizer. (ii) adjustment for price distortions in traded and nontraded items. Both traded and nontraded items are shadow priced in the economic analysis. Thus the difference in the results of this and the world Bank study may be attributed to the fact that DRCs or RCR are sensitive to price and exchange rate changes. This is checked by doing a sensitivity analysis.

Results of the economic analysis for maize are given in Table 23. Both smallholder oxen technology and small commercial farms have positive and higher economic profitability than cotton as indicated by net economic profitability. Both categories of producers are efficient producers of maize in the country, given resource cost ratios that are less than unity. Using the second approach for estimating DRCs, again taking the ratio of unsubsidized domestic costs and the difference between revenue and economic foreign exchange costs, gives a DRC of 0.44 for oxen technology maize farmers and 0.46 for small commercial farmers. The results are consistent with the first approach.

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[73] Gittinger, J.P. pp250-270 1982

TABLE 23

Maize: Results of Economic Analysis, 1988/89

	Oxen technology	small Commercial
Yield 90Kg bag/ha	25.00	50.00
Producer price ZK	211.23	211.23
Revenue	5,280.73	10,560.46
Capital Inv.	4,461.01	15,465.24
Variable cost	2,720.82	5,632.84
Fixed cost	422.20	1,628.14
Total econ.cost	3,142.01	7,226.99
Profit (NEP)	2,137.72	3,300.47
Resource cost Ratio	0.60	0.69

Notes: (1) Producer price used in the calculation of revenue
is the estimated f.o.b price of $16.58 per 90 Kg bag.
F.o.b. price is used because the country has had
surplus maize production in the last two years which
it has exported.
(2) Calculated by author from Tables 15 and 16

The conclusion from the above analysis is that maize production has been financially more profitable than cotton. Equally, maize ranks first in terms of economic profitability. This augers well with the goal of food self sufficiency and also implies that maize could be considered for export. Cotton is not favourable except for smallholder farmers. The next step is to determine what conditions would have to change to make cotton profitable. This is the focus of the next section.

7.5.3   Sensitivity Analysis of Results

The previous section indicates that except for smallholder oxen farmers, cotton as it is presently produced, is not an efficient user of resources and cannot compete with maize. In order to determine some of the conditions that might be altered to improve export production pros-

pects, we do sensitivity analysis. The purpose of sensitivity testing is to determine the important parameter assumptions upon which the analysis is based. This section therefore presents the results of the sensitivity analysis of the financial and economic results to changes in three important variables; yield, world price and shadow exchange rate (through the foreign exchange rate premium). These variables were chosen to examine the impact of agronomic, economic and government policy on

TABLE 24

Cotton: Sensitivity Analysis on Yield

	Yield/ha Kgs	Financial Prof.(K/ha)	Economic Prof.(K/ha)	RCR
Oxen Technology Farms:				
	500	(888.99)	462.33	0.87
	600	(528.99)	1179.33	0.73
	*750	11.01	2254.83	0.58
	800	191.01	2613.33	0.54
	900	551.01	3330.33	0.48
	950	731.01	3688.83	0.46
	1000	911.01	4047.33	0.44
Small Commercial Farms:				
	600	(1619.85)	(2286.62)	1.53
	700	(1259.85)	(1569.62)	1.31
	800	(899.85)	(852.62)	1.15
	*900	(539.85)	(117.62)	1.01
	1000	(179.85)	581.38	0.92
	1200	900.15	2732.38	0.77

Notes: (1) calculated by author
(2) ( ) denotes negative values
(3) * indicates base results
(4) Yield levels are based on historical averages and also reflect regional differences

the net profitability of cotton production.

Yield levels are varied from 500 to 1000 kgs per hectare and are said to be within achievable ranges.[74] As expected, the results show that at higher yields both the financial and economic profitability improve. For smallholder producers, yields can go as low as 500 kgs (33 percent below current levels) and the category still maintains its economic profitability and comparative advantage, even though financial profitability is negative. For small commercial farms, yields have to increase above the 900 kgs/ha (33 percent) base level before it becomes economically and financially profitable to produce cotton. This analysis underscores the importance of increasing yields for both categories, but yield increases are required most by small commercial farms. Yield levels can be increased through improved management, better extension services, and research that is oriented torwards improving existing varieties.

We now vary the f.o.b. price of cotton while holding the yield and shadow rate at their base levels. The chosen f.o.b. prices are within historical levels of world cotton lint prices.

Changes in the cotton lint f.o.b. price affects economic profitability and RCR in the expected direction. Increases in f.o.b. price lead to improvements in the economic profitablity and RCR for both categories of producers. The increase in f.o.b. price means higher economic revenue to producers and hence higher economic profitability.

Another important variable affecting profitability of exports is the exchange rate. It is therefore important to assess the impact of the exchange rate, that is, the shadow exchange rate (through the exchange

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[74] Lintco, 1988.

TABLE 25

Cotton: Sensitivity Analysis, f.o.b. Price

f.o.b. lint price (cents/lb)	Oxen techn. Econ. Prof.	RCR	Small Commercial Econ. Prof.	RCR
50	1609.83	0.66	(912.95)	1.16
55	2082.33	0.60	(345.38)	1.06
*57	2254.83	0.58	(117.62)	1.01
60	2554.83	0.55	222.18	0.97
65	3027.33	0.51	789.75	0.89
70	3499.83	0.47	1357.32	0.83
75	3972.33	0.44	1924.89	0.77

Notes: (1) The f.o.b lint price has been adjusted to the producer price equivalent in the calculation of economic profitability and the RCR
     (2) ( ) denotes negative values
Source: Calculated by author

TABLE 26

Sensitivity Analysis: Shadow Exchange Rate

Exchange Rate	Forex Premium	Smallholder RCR	Econ. Prof.	Small Commercial RCR	Econ. Prof.
8.22	1.00	0.78	762.68	1.27	(1160.73)
10.28	1.25	0.67	1440.93	1.13	(684.16)
12.74*	*1.55	*0.58	2269.22*	*1.01	(117.62)
14.39	1.75	0.53	2944.32	0.94	441.68
16.44	2.00	0.48	3703.98	0.88	1014.75
18.50	2.25	0.47	4150.45	0.87	1212.01
20.55	2.50	0.45	4825.47	0.84	1683.51
22.61	2.75	0.42	5504.72	0.81	2160.08
24.66	3.00	0.41	6179.74	0.79	2631.65

Notes: (1) Exchange Rate ZK/US $
     (2) * Denotes base results
     (3) ( ) Indicates negative values
Calculated by author

rate premium) on profitability of the different categories of producers.

An increase in the shadow exchange rate makes cotton production more economically profitable both for smallholder and small commercial farmers. Smallholder oxen technology farmers still remain the more efficient producers with lower resource cost ratios and higher economic profitability than small commercial cotton farmers.

Recently there has been a deliberate decline in the value of the Kwacha against the U.S. dollar, with the Kwacha currently (January 1990) at K22.00 to a dollar. Given no other changes, this implies that the foreign exchange premium which is the ratio of the shadow exchange rate and the official rate, should decline to about 0.80. Therefore, depreciation in the value of the Kwacha implies that export production will become more profitable from the country's point of view.

Chapter VIII

EXPORT MARKETING POTENTIAL AND CONSTRAINTS

8.1 WORLD AGRICULTURAL TRADE ENVIRONMENT

It is important that any study of Zambia's agricultural export sector be placed in the overall context of the current and prospective world trade environment. In this chapter a brief review of the current crisis in world agriculture, attempts at trade liberalization through GATT negotiations, current and prospective world market for cotton, as well as Zambia's experience in cotton marketing are discussed. The chapter ends up with a summary of implications for Zambia's cotton export expansion effort.

World agriculture is currently facing a number of problems. The symptoms of these problems include the burdensome stocks of several key commodities (such as wheat and dairy products like butter), aggressive competition between developed agricultural export countries for market share (notably the EC and North America), declining world prices for some agricultural commodities such as coffee, serious financial problems at the farm level, international trade conflicts, and continuing malnutrition and hunger in some parts of the developing world.

A combination of some of the above factors has contributed to the current problems in world agriculture namely:[75]

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[75] Miner, W.M. and Hathway,D.E. _World Agricultural Trade: Buiding a Consensus._ 1988

1. government subsidies which distort market signals to farmers. In developed countries artificially high prices stimulate production while in developing countries low administered prices are a disincentive;

2. continuing increases in agricultural productivity due to the application of new technology;

3. low demand for food due to slower world economic growth during the 1980s and barriers to trade in importing countries, leading in turn, to higher prices to consumers, exacerbating demand problems;

4. in developing countries, inappropriate exchange rate policies and taxes that penalize the export of agricultural products; and

5. agricultural export subsidies 'wars' between the developed countries especially the U.S. and the E.C.

Exports from developing countries continue to be hindered by a wide range of trade barriers, both tariff and non- tariff barriers. The elimination or reduction of these barriers is a major objective of multilateral trade negotiations in the Uruguay Round of agricultural negotiations. Lower barriers plus the reform of domestic agricultural policies have the potential to enlarge world trade in a number of commodities as well as leading to stronger and more stable prices and increased exports from a number of developing countries. On the part of Zambia, policy reform should include maintainance of appropriate exchange rate, improved incentives for agricultural production, a high priority for agriculture in the allocation of scarce national resources, and improved marketing infrastructure.

8.2 WORLD COTTON MARKET

World production of cotton has increased from an average of 48.2 mil-
lion bales in 1960-64 to an estimated 67.2 million bales in 1979-83, an
increase of 39 percent. Cotton trade however, increased only 20 percent
in the same period, from an average of 16.7 to 20.1 million bales.[76]
Even though cotton production and trade have increased worldwide, cot-
ton's share of world fiber production fell from 76 to 50 percent between
1960 and 1980. This is due to competition from manmade fibers such as
polyester and rayon.

The U.S. and the Soviet Union are the world's largest cotton export-
ers with shares in 1981-83 of 32 and 20 percent respectively.   Other
major producers and exporters with a significant 1981-83 share of the
world market include Egypt (4.8%), Pakistan (4.5%), Turkey (4%), Sudan
(3.3%), Mexico (2.8%) and Guatemala (1.7%).   Major sub-saharan African
cotton producers include Tanzania, Uganda, Zimbabwe, Malawi and Zambia.
(Appendix D on trade volumes)

Seven countries account for 50 to 60 percent of world cotton imports.
These are Japan, Taiwan, Hong Kong and South Korea in south east Asia.
The major European cotton importers are France, Italy, and West Germany.
Their import shares are shown in Table 27.

Based on staple length, there are three only partially competing
groups of cotton lint traded on the international market.   These are
short staple, medium staple and the long and extra long staple.   The
short and medium staple cotton account for most of world's supply.[77] The

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[76] USDA Cotton Outlook Report 1986.

TABLE 27

World Import Shares on Cotton 1981-1984

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----------------------------------------------------------
          Country              Percent
          -------              --------
          Japan                 17.0  |
          South Korea            8.0  |
          Taiwan                 6.0  |  *
          Hong Kong              4.0  |

          France               4 to 5 |
          Italy                4 to 5 |  **
          W. Germany           4 to 5 |
----------------------------------------------------------
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Notes: * Refers to 1981-83 period
       ** Refers to 1984
Source: USDA Economic Research Service, "Cotton: Background
        for 1985 Farm Legislation." Agriculture Information
        Bulletin No. 476, 1984

demand for extra long and long staple cotton in the international market

is said to be high. These varieties command premium prices on the

international market. However, the bulk of world cotton lint production

is of the short to medium staple varieties. Egypt is the largest pro-

ducer and exporter of extra long staple cotton in the world, followed by

Sudan and Peru[78]

On the international market, cotton lint prices are quoted on the

basis of two indices, A and B, reflecting quality differences. The 'A'

index is the more reliable guide to the price in the world markets.[79]

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[77] Thomson, F.L. and Foote, R.J. Agricultural Prices. 1952.

[78] Mansour, M.S. "An Economic Anaysis of the World Market for Egyptian
     Cotton" World Agricultural Economics and Rural Sociology Abstracts.
     Vol. 25 No.5 1987

[79] USDA Agricultural Outlook Report. 1989.

World cotton lint prices like most agricultural product prices, fluc-
tuate depending on supply and demand factors. The general trend has
been that of small increases in the price after a drop in the early
1980s. The outlook for cotton prices up to the end of 1990 is that they
will remain at current levels or improve slightly.[80] Price prospects
for selected commodities are shown in Appendix C. World price project-
ions for cotton appears to be more favourable than those of maize and

TABLE 28

Liverpool A index Lint Prices

Year	A Index price cents/lb
1984/85	69.2
1985/86	48.9
1986/87	62.0
1987/88	72.7
1988/89*	61.3
1989**	66.0

Source: USDA Agricultural Outlook Report, 1989
Notes: * December 1988
       ** March 1989

this has positive implications for cotton exports.

According to World Bank projections, cotton production is expected to
increase during the 1990s. Most of this increase will occur in develop-
ing countries, with China, India and Pakistan as lead producers. World
demand for cotton is also expected to increase, resulting in increases
in world exports during the same period. The greatest increases in
exports is expected to occur in south east Asian countries. Declines in

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[80] USDA ibid. 1989 p15

cotton exports from Africa (a result of declines in some major producing countries such as Uganda and the Sudan), is expected to turn around. Gross exports from Africa are projected to increase from 742,000 tonnes in 1988 to 945,000 in 1995. As long as demand and consequently, price increases, this is a favourable scenario for a country wishing to export.

8.3 EXPORT MARKET OUTLOOK FOR ZAMBIA'S COTTON

Given Zambia's small export volumes of cotton, the country may be considered a fringe supplier to world markets with quantities not likely to affect international market prices. This has positive implications for the country's export effort in agricultural products.

While current lint exports of Zambia go primarily to Europe, other export markets may be serviced, provided production can be increased further. These include major cotton consuming African countries such as Algeria, Morocco, Tunisia and Nigeria. Another important cotton consuming and potential export region is south east Asia; Indonesia, South Korea, Japan, Hong Kong and Taiwan.[81]

Preferential trade arrangements for both agricultural and non agricultural commodities exist in the Lome Convention between the European Community and the African, Carribean, and Pacific (ACP) nations. This trade arrangement involves the extension of favourable concessions on both volumes and prices of selected export commodities, both raw and manufactured. Some of the agricultural commodities included in the trade arrangement are sugar, bananas, rice, coffee, cocoa and value add-

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[81] USDA, Economic Research Service, Cotton Outlook. 1985.

ed cotton commodities like textiles.

The Lome Convention has been unable to protect traditional exports either from losing market shares and falling prices which are subject to international world supply and demand forces. However, the Lome Convention has played a role in facilitating the growth abeit from a small base, of new ACP nations' exports. In addition, the benefits to ACP countries are concetrated in certain commodities such as sugar, rice, bananas and textiles.[82] In its agricultural export drive, Zambia may have the opportunity to take advantage of the benefits from preferential trading arrangements, especially in the export of value added agricultural commodities like textiles.

In recent years, the regional grouping of countries, the Southern African Coordination Committee (SADCC), and the Preferential Trade Area (PTA), have increasingly expressed the desire to expand intraregional trade, including agricultural trade. Increasing regional trade is seen as one means to reduce external market dependence and to accelerate economic development in the region. However, levels of official trade among SADCC and PTA countries have historically been low, at 4-5 percent annually.[83] Constraints on expanding intraregional agricultural trade include; inappropriate pricing policies, shortages and official rationing of foreign exchange, overvalued exchange rates, state monopolies on trading, bureaucratic red tape, and entrenched trading patterns with

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[82] World Bank, Carribean Exports: Preferential Markets and Performance. 1988.

[83] Kingsbury, D.S. "Agricultural Pricing Policy and Trade in Several SADCC Countries, Preliminary Results." in Mudimu, G. and Bernstern, R.H. (eds) Household and National Food Security in Southern Africa. 1988

former colonial powers. Possible actions to overcome these constraints include the simplification of administrative procedures, the strengthening of local currency based mechanisms of settling trade accounts, the introduction of barter and countertrade arrangements, tariff reductions and greater incentives to export.

Traded agricultural commodities in the region include maize, rice, sugar and agricultural inputs like seed. There is very little trade in cotton lint. However, small quantities of value added cotton products such as grey cloth, cotton yarn, fabrics, and clothing are traded.

Given the current world agricultural trade environment, it is important for Zambia to keep track of important factors such as world production, world demand and world prices for agricultural commodities of its special interest like cotton. There is need for market information on potential export markets which may have to be sought if export volumes expand. Markets for quality cotton lint exist in high population density countries of North Africa, and South East Asia. Consideration has to be given to expanding intraregional trade. To this effect, there may be need to encourage countertrade in value added products.

The above scenario ragarding world prices and trade, preferential export potential and prospects for trade in the SADCC and PTA region provides some optimism for Zambia's agricultural effort but it is a tough and somewhat uncertain environment.

Chapter IX

SUMMARY AND CONCLUSIONS

This study set out to examine the following: to develop a framework for investigating and evaluating the prospects for increasing production of specific agricultural crops in Zambia and apply that framework to determine export potential for cotton;   to indicate the relative finan- cial and economic profitability of cotton production to its major com- peting crop, maize; to determine how market infrastructure influences ability to increase exports; to assess the impact and appropriateness of government policies and incentives affecting production of cotton in Zambia; and to determine export market prospects for cotton and benefits from export development.

With regard to the first objective, the conclusion of the study is that the framework summarized in the flow chart in Figure 1,   is an important one in terms of highlighting the important linkages of an export development strategy for a country like Zambia.   As for the sec- ond objective, it was found that cotton production is financially and economically more profitable (at producer prices existing in the 1988/89 production season) for smallholder oxen producers than for small commer- cial farmers.   Maize production is financially and economically more profitable to both farm groups than cotton.   Results of sensitivity analysis on three variables deemed important, namely, yield world price, and shadow exchange rate indicate that financial and economic profit-

ability improves for both categories of cotton producers as the yield
level and world prices increase and as the value of the Kwacha relative
to the US dollar falls. One conclusion from these results is that Zambia
should be encouraging increased use of oxen technology for these crops
as it is domestic resource intensive. A further conclusion is that, from
the production standpoint, maize appears to offer greater prospects for
production expansion than cotton. To achieve significant expansion in
cotton from the production standpoint would require more favourable pro-
ducer prices, higher yields and better extension services.

The cost of production based uniform pricing policy does not current-
ly compensate cotton producers for the value of the byproduct oil in the
seed. This implies that cotton is underpriced.   There is need for a
review of the pricing methodology, possibly a move towards world price
equivalent producer prices that reflect the value of the byproducts, oil
and meal. The present cost of production based prices, if our analysis
is correct, does not.

On the effectiveness of the marketing infrastructure to handle the
product from the producer to the export level, it was found that excess
capacity to gin increased production of cotton exists. However, con-
straints in marketing infrastructure include ineffective grading at the
farm level, insufficient storage facilities and high marketing costs.
While Lintco has done well in other areas such as rapid payment to farm-
ers and relatively better extension services to farmers, more needs to
be done to reduce marketing costs and to ensure that export quality cot-
ton is available. The government directive to Lintco of promoting crops
like soybeans and coffee has been financially and administratively tax-

ing to the Company and reduces its effectiveness. This aspect of Lint-
co's operation has benefits to some producers and possibly to some
aspects of national goals, but to the extent that Lintco's performance
is reduced in its primary product cotton, there may be a more effective
approach to achieving all goals. That would likely mean reducing Lint-
co's responsibilities in coffee and soybeans, or compensating it for the
costs.

The study also found that export market potential likely exists in
south east Asian countries as well as the high population countries of
north Africa. Potential for expanding regional trade in the SADCC and
PTA countries as well as preferential trade arrangements under Lome
Treaty also exists. However, constraints in the export market include
fluctuations in world cotton prices due to supply and demand changes,
competition from major producers and synthetic substitutes for market
share and low intraregional trade in agricultural products. Prospects
for improving world agricultural trade exist through GATT negotiations.
There is need for effective market intelligence on agricultural export
commodities of Zambia's interest. This is important in the case of cot-
ton as it is traded in many forms on the international market; as cotton
lint, yarn, fabric or as finished apparel. The export drive should
encourage exporting both lint and value-added products. To this effect,
there may be need to solicit expert advice and training of local person-
nel in agricultural export marketing and to ensure that the required
domestic changes are made.

These constraints imply that Zambia faces serious but not insummoun-
table challenges in its cotton export effort. To accomplish its agri-

cultural export expansion objective, Zambia requires conducive government policy in the areas of producer incentives, marketing infrastructure, trade policy, and a favourable world trade environment. Production of cotton for the export market should therefore be encouraged under the above conditions. Further, only under these conditions can Zambia's agricultural export development effort be beneficial.

There is need for an integrated approach to expanding production of cotton exports based on the Food and Agricultural Organization's (FAO) Four I's namely; Inputs, Institutions, Incentives and Infrastructure. The approach used in this study may be extended to other crops with export market potential. Benefits to be realized from agricultural export development include the foreign exchange to be obtained from quantities exported, the diversification and widening of the export base that this entails, and generation of employment and incomes at production, marketing and processing levels.

9.1 LIMITATIONS OF THE STUDY AND FUTURE WORK

This study, like many others on economic problems of developing countries, has a number of limitations. A brief discussion of these limitations follows, along with a few implications. The section is concluded with some suggestions for further research which would improve the applicability of these results for policy formulation purposes.

In the estimation of economic profitability of cotton production, the study did not adjust for input and crop transport subsidies. These subsidies are a result of uniform pricing policy and are particularly high

for low yield producers and for those producers located far from processing plants. The quality of data used in the analysis is largely from surveys of three major cotton producing regions and may not likely reflect production and marketing aspects of other cotton producing regions. The study does not also address the issue of labour availability which is necessary to achieve increased production for the export market. This is of particular importance for competing crops like cotton and maize. Future work should therefore incorporate the impact of subsidies and labour availability on production of agricultural products in particular. Further, future analytical work on agricultural export commodities should be confined to each specific component, that is, production, marketing and international trade. On the production side, analytical work is required to estimate resource cost ratios at regional levels in order to establish regional comparative advantage. This is important because it establishes the efficiency of resource use between regions, and could be a starting point for establishing regional producer prices. Research on cotton should also address the issue of how to raise yields, improve staple length and put in place a pricing system that takes into account the value of oil and other cotton byproducts as well as the lint. Studies are also required to assess how other agricultural export crops compare with cotton in terms of comparative advantage and ability to generate foreign exchange.

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Appendix A

CALCULATION OF SHADOW EXCHANGE RATE

1970 Base Year:

	Exchange Rate	CPIz	CPIus
	1.4	13.8	47.4
Index	100.0	100.0	100.0

1988

	0.1216	337.8	109.9
Index	8.7	2347.8	131.8

Real Effective Exchange Rate= 8.7*(2348/132)= 154.9

Factor= (1970 Re/1988 Re)*1988 Ne

=(100/154.7)*0.1216=0.0785 US $ per Kwacha

OR K12.74 per U.S. dollar

Foreign Exchange Premium = Shadow rate/Nominal rate=1.55

Appendix B

OILSEEDS: MARKETED PRODUCTION, 1980-86

Year	Sunflower	Soyabeans	Cottonseed	Groundnuts
1980	10,662	1,012	13,745	2,055
1981	18,637	3,673	10,005	1,327
9182	20,246	3,914	7,666	764
1983	30,464	6,898	18,737	1,041
1984	40,425	9,556	26,345	1,157
1985	25,496	10,601	18,152	2,419
1986	23,750	11,700	19,407	4,001

Source:Deloitte Haskins and Sells "Study of the Oilseed
Sector in Zambia" 1987.

Appendix C

SELECTED AGRICULTURAL COMMODITY PRICES

Year	Coffee Cents/kg	Maize $/MT	Cotton Cents/kg	Tobacco $/MT
1980	330	120	196	2205
1981	269	125	176	2241
1982	298	106	154	2331
1983	288	135	184	2229
1984	321	137	180	2011
1985	321	112	132	1950
1986	363	74	89	1762
1987	193	58	127	1471
1988	213	77	99	1459
1989	211	73	99	1431
1990	211	65	186	1475
1995	204	68	123	1492
2000	205	73	116	1439

Notes: (1) 1988 to 2000 are Projections
      (2) All prices are US $
Source: World Bank, "Price Projections for Major Primary
      Commodities" Report No. 814/88 Nov. 1988

Appendix D

COTTON LINT IMPORTS AND EXPORTS: SELECTED COUNTRIES

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              Imports MT                      Exports MT
           1984   1985   1986            1984      1985     1986
Africa

Algeria 38,669 19,310 20,000   Egypt   174,319 143,833 131,000
Morocco 11,773 17,750 18,700   Mali     56,000  60,000  68,600
Nigeria 25,704 25,608 45,000   Sudan   210,566 100,400 150,000
S.Africa 35,642 23,690 21,950  Tanzania 32,000  28,000  30,000
Tunisia 12,511 18,580 18,250   Zimbabwe 58,386  67,379  80,683

N & C America
Canada  54,100 43,767 50,995   Mexico 123,389  77,044  55,725
Cuba    46,720 50,268 40,000    USA  1,499,632 1,094,585 657,391

South America                           212,116  409,456  226,787

Argentina 9,237  5,724  7,500
Brazil    7,768 20,636 75,239
Chile    16,677 17,626 25,849
Equador  11,724  5,015   2000
Venezuela 18,668 8,354  2,822

Asia

Bangladesh 72,173  59,914  45,440
China      304,000 287,998 385,608  China 218,000 261,000 558,089
Hong Kong  217,605 199,355 255,353  India  34,000 75,000 221,000
Indonesia  125,356 128,555 171,379  Pakistan 98,222 257,588 638,510
Japan      707,973 680,967 694,979  Syria  147,924 90,754 98,018
South Kore 352,814 361,356 377,379  Turkey 100,543 124,7829 140,701
Malaysia    29,617  24,314  28,314
Phillipines 15,683  19,979  41,177
Thailand   116,000 132,538 193,219

Europe
                                    USSR 642,325 658,674 712,813

Czechoslovakia   125,903 125,961 114,554
France           165,179 159,155 161,728
W. Germany       212,397 239,864 238,445
Italy            257,031 257,044 277,778
Poland           158,667 165,489 147,700
Romania           86,500 102,000 100,000
Yugoslavia       126,861 144,833 126,248
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Source: FAO Trade Yearbook 1986

Appendix E

Cotton: Methodology For Deriving World Price Equivalent Producer Price

1. Lint fob export price, ex Lusaka K/mt

2. Extraction rate, lint/seed cotton %

3. Seed cotton equivalent of lint export mt
   proceeds(line 1* line 2)

4. Less ginning costs, K/mt

5. Less Lintco overheads, K/mt

6. Less packing material costs, K/mt

7. Equals net revenue from lint

8. Oil, landed Lusaka cost of imported crude
   edible oil, K/mt

9. Extraction rate, oil/mt seed cotton

10. Seed cotton mt equivalent of oil import
    parity costs (line 8* line 9)

11. Less oil processing costs per mt seed cotton

12. Equals net revenue from oil

13. Cake, landed Lusaka cost of imported K/mt

14. extraction rate, cake/mt seed cotton

15. Net revenue from cake (line 13* line 14)

16. Plus savings of refining imported crude
    oil, K/mt seed cotton

** Equal world price equivalent producer
   price, Lusaka, K/mt (lines 7+12+15+16)