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THE UNIVERSITY OF ALBERTA

# INCOME DISTRIBUTION IN MALAWI

by

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A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "Income Distribution in Malawi" submitted by Augustine Yelemia Bobe in partial fulfilment of the requirements for the degree of Master of Science.

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Date 1 June 1976

## ABSTRACT

Considerable development has occurred in Malawi since the country became independent in 1964 but little is known about the distribution of income or the benefits of the development. This study is an attempt to provide quantitative income distribution information for Malawi for 1968/69.

After reviewing economic theory relating income distribution to development, the study examines the applicability of welfare economics in the derivation of measures of income distribution disparity. The review reveals that the relationship between income distribution and development is little understood, and the question of income distribution in developing countries such as Malawi has remained relatively undisclosed until recently. Welfare economics, on the other hand, provides insight into the welfare considerations a measure of income distribution inequality should have but stops short of a criteria for the actual quantification of income distribution inequality.

Several summary statistical measures of income inequality have been computed for various estimates of rural cash income distributions in Malawi for 1968/69. The income distributions were estimated from the 1968/69 National Sample Survey of Agriculture data. The various definitions of income, and regional and district income

distributions are compared using the standard deviation of logarithms rankings of inequality. The choice of the standard deviation of logarithms was based on the relative importance of low income groups in the 1968/69 Malawi income distributions and the ability of the measure to ignore proportional additions of income to the income distributions. The general conclusion of the study is that cash income in the rural areas of Malawi in 1968/69 was unequally distributed regardless of the definition of rural cash income used.

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# CHAPTER I

# INTRODUCTION

## Income Distribution and Economic Development

Development economists are increasingly being faced with devising a strategy which will ensure a fairly equitable distribution of the benefits of economic development. Previously economists paid little attention to empirical analysis of the effect of economic development on income distribution. The main goal of economic development was growth of per capita income with the implicit and/or sometimes the explicit assumption that equitable income distribution would follow. However income growth is meaningless when divorced from distributional considerations. Gross national income is the sum of various goods and services indexed by their prices, and prices are partly determined by the distribution of income. Maximization of gross national income or per capita income without considering distributional consequences could therefore lead to a misleading indication of national welfare.

Income distribution considerations received little attention in early works on economic development for a number of reasons. The first and perhaps the single most important reason is due to the hypothesis that income

inequality promotes rapid economic development by increasing the rate of savings and capital formation. While increasing income inequality may stimulate growth in the short-run, it is questionable whether such growth could be sustained because income inequality conflicts with the development of the domestic market needed for sustained growth. Empirical research has yet to show whether income inequality accelerates growth or whether it impedes growth by limiting growth skills and knowledge of the population and killing the domestic demand essential for sustained growth.

Secondly, income distribution policies in economic development have been limited by the absence of knowledge on distributional effects of economic development. National income figures and census data of many developing countries rarely contain the information required for analysis of the income distributional effects of growth. To compound the problem, the evaluation of distributional consequences into comparable terms with other costs and benefits has further led to the disregard of distributional effects in cost-benefit analysis, the technique most widely used in the evaluation of development programs. In order to apply the right policy for economic development it is necessary to know the present level of development as well as the type and degree of inequality of income. A measure of the degree and type of income inequality should therefore be regarded as one of the first steps towards the solution of economic development problems.

Thirdly, some positive economists, who often act as economic development advisors, regard income distribution issues as normative and therefore unfit for objective analysis. Finally, but not least, rural people in most developing countries lack both economic and political power to influence policy makers in development issues. Development programs are concentrated in urban centres and the most favoured geographic regions. More often than not, development programs are designed by high income civil servants without input from the low income people who are to benefit from the programs.

Unless distributional policies are purposely incorporated into development programs, the conventional neglect of income distributional effects of economic development makes one wonder whether economic development does not generate forces which lead to unequal distribution of income or development benefits. It would appear that allocative efficiency considerations alone, would force policy makers to concentrate development efforts in areas with the highest potential returns thereby compounding the income distribution disparity which arises from regional and personal endowments.

This study is an attempt to provide policy makers in Malawi with the necessary distributional information for making development policy decisions. The objectives of the study are:

(a) to measure the 1968/69 distribution of rural income in Malawi, and

(b) to find out if distributional considerations have been effectively incorporated in the siting of development projects as stated in the Statement of Development Policies 1971-1980.[1]

## Malawi Development Strategy

Malawi lies some 560 km. (350 miles) west of the Indian Ocean. It is a long narrow country 852 km. (530 miles) in length and 160 km. (100 miles) at its broadest part. It shares boundaries with Mozambique in the east and south, Zambia in the west and Tanzania in the northeast (see Map 1.1).

During the colonial era development was concentrated in the Southern Region since the only rail link with the outside world ran south to Beira on the coast of the Indian Ocean. This tendency was confirmed by siting the first seat of government in the Southern Region. At the time of independence in 1964 only a small proportion of Malawi's natural resources, those located within the Shire Highlands core area (area around Blantyre, Zomba, Thyolo and Mulanje on Map 1.1) and around Lilongwe, had been partially developed. In the Lilongwe area, development mainly consisted of European owned tobacco estates. In the Shire Highlands

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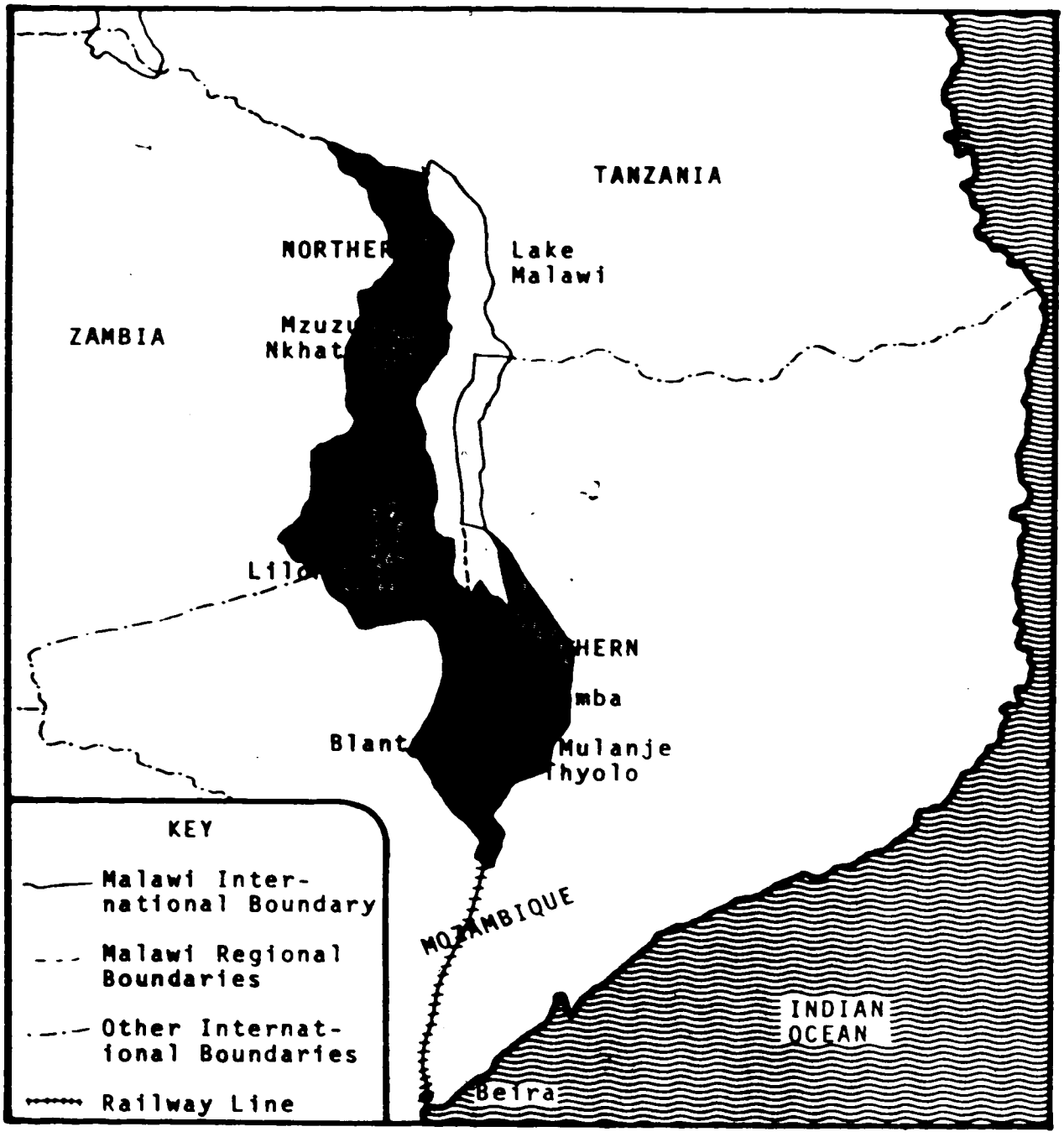
[1] Malawi Government, Economic Planning Division, Statement of Development Policies 1971-1980 (Zomba: Government Press, 1971).

MAP 1.1

MALAWI IN EAST CENTRAL AFRICA



core area, emphasis was placed on the development of manufacturing industries and the expansion of service industries in Blantyre city, vegetable and milk production within a radius of 24 to 32 km. (15 to 20 miles) of Blantyre, and banana and pineapple production in the wetter and warmer areas south of the European owned tea estates in Thyolo and Mulanje. In the Northern and the North Central Regions (north of Lilongwe), development was limited because of the high cost of transportation to and from Blantyre and Beira despite the potential cheap water transport provided by Lake Malawi. Pre-independence development was restricted to the rubber, and later, the tea estates near Nkhata-Bay, and the Colonial Development Corporation's tung estates around Mzuzu. Peasant farmers raised some cattle, but were principally migrant labour for Zambia, Tanzania, Rhodesia, South Africa and the Southern Region.

The effect of such an historical setting resulted in considerable population movements towards the south and a much lower level of development in the Central and, in particular, the Northern Regions. By 1966, 51 percent of the population was living in the Southern Region where population densities were three and a half times as high as in the Northern Region.[1] As a result, most of the areas outside the Southern Region and the Lilongwe core area were deprived of their healthy active male labour force.

---

[1] Ibid., pp. 5-6.

Since independence in 1964, considerable development has been achieved. One important aspect of Malawi's development strategy has been:

> ...to ensure that the fruits of development are spread as evenly as possible throughout all sections of the population and all parts of the country.[1]

A number of measures have been taken to bring about this more even spread of development.

Malawi is predominantly an agricultural country with an economically active population of approximately 1.5 million people, of whom less than 150,000 are in paid employment in Malawi, and about 250,000 who are working in neighbouring countries.[2] This leaves well over one million workers -- and their dependents -- whose only income is derived from small-scale agriculture. The level of real personal income was estimated at K60.00 average GDP per person in 1970, of which only K38.00 was cash income.[3] The rest was non-monetary income. The agricultural production mostly occurs on small farms[4] as reflected in the proportion

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[1] Ibid., p. 5.

[2] Ibid., p. 1.

[3] Malawi Government, National Statistical Office, Malawi Statistical Yearbook 1973 (Zomba: Government Press, 1973), p. 177.

[4] The average holding size per household of smallholder farms for the crop season 1968/69 was estimated at 3.8 acres. See: Malawi Government, National Statistical Office, National Sample Survey of Agriculture 1968/69 (Zomba: Government Press, 1970), p. 15.

of national income derived from small holder agricultural activities (Tables 1.1 and 1.2) although estate and government shares of agricultural GDP have been increasing.

The above pattern of economic activities among the population and the nature and distribution of economic resources have dictated Malawi's development strategy which gives top priority to raising agricultural productivity by making maximum use of land and labour, factors in which Malawi is well-endowed, and economizing on the use of the scarce factors, capital and skills. Map 1.2 shows the spread of on-going and planned agricultural development projects which have been planned so as to meet the country's objective of an even spread of the fruits of development.

Beginning in the Northern Region, development projects have been launched or planned as follows (refer to Map 1.2).[1] A development project consisting of the development of crop farming, both dry-land and irrigated, with emphasis on rice production, has been launched in the Karonga Rural Development Project area. The project includes animal husbandry development, road and lake transportation improvements and improvements in health services. The Nkhata Bay Integrated Development Project has been appraised and has resulted in a shift of emphasis to the Karonga Development Project and

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[1] Information on agricultural development areas has been summarized from A Working Atlas of the Lilongwe Land Development Program (Blantyre: Department of Surveys, 1971), commentary facing Plate 1.

TABLE 1.1

MALAWI GROSS DOMESTIC PRODUCT ACCOUNTED FOR BY AGRICULTURE, 1964-1970

| Item | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | Unit |
|---|---|---|---|---|---|---|---|---|
| Agriculture: | 84.8 | 99.2 | 107.6 | 110.0 | 110.0 | 117.8 | 124.8 | K (million) |
| | 57.3 | 57.2 | 55.3 | 53.8 | 46.6 | 50.5 | 48.4 | % |
| Other Sectors: | 63.2 | 74.3 | 86.9 | 94.6 | 104.4 | 115.5 | 133.3 | K (million) |
| | 42.7 | 42.8 | 44.7 | 46.2 | 53.4 | 49.5 | 51.6 | % |
| Total GDP at factor cost - current prices: | 148.0 | 173.5 | 194.5 | 204.6 | 214.4 | 233.3 | 258.1 | K (million) |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | % |

Source: Malawi Government, N.S.O., Malawi Statistical Yearbook 1973 (Zomba: Government Press, 1973), Table 20.1, pp. 176-177.

TABLE 1.2

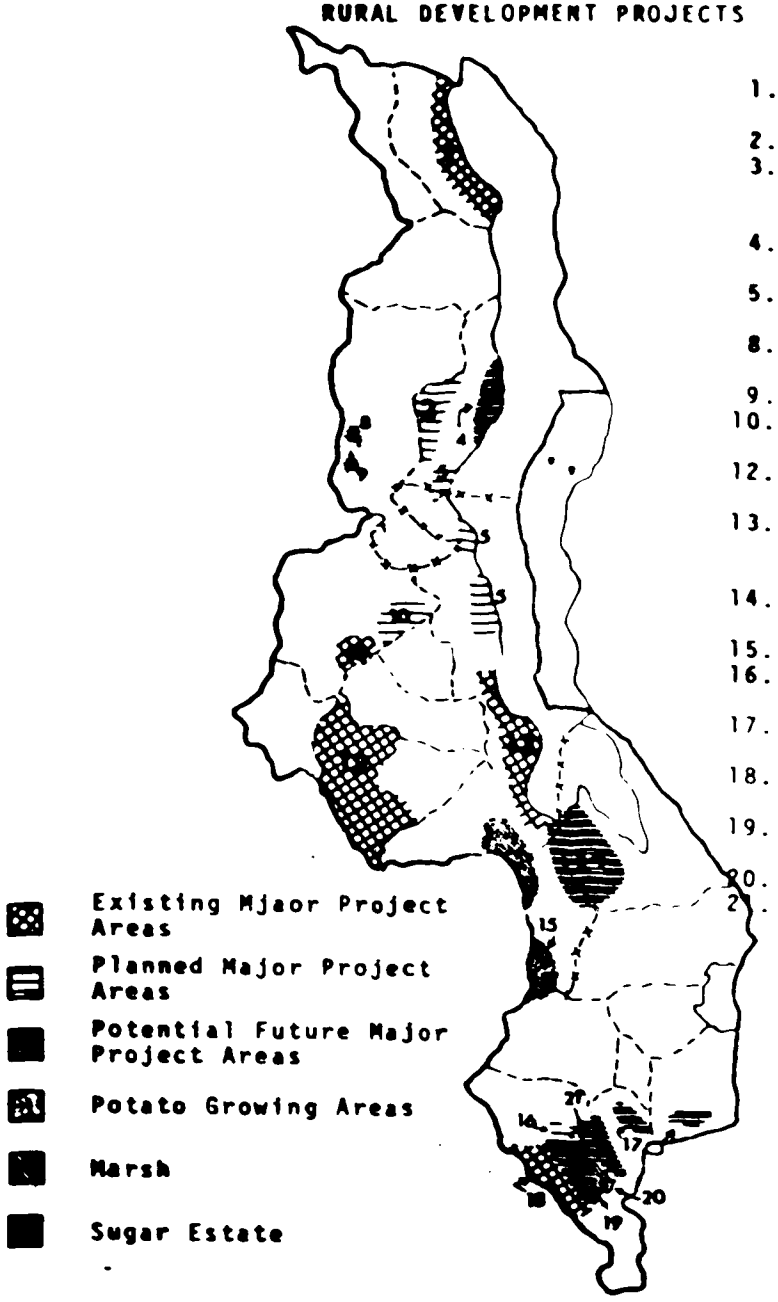
PERCENTAGE OF AGRICULTURAL GDP ACCOUNTED FOR BY SMALL HOLDERS AND ESTATES AND GOVERNMENT, 1964-1970

| Item | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|
| Small holders: | | | | | | | |
| Monetary | 74.3 | 71.6 | 73.1 | 71.3 | 71.8 | 68.5 | 70.4 |
| Non-monetary | 18.8 | 21.9 | 20.4 | 22.1 | 20.0 | 22.1 | 20.4 |
| Sub-total | 93.1 | 93.5 | 93.5 | 93.4 | 91.8 | 90.6 | 90.8 |
| Estates and Government | 6.9 | 6.5 | 6.5 | 6.6 | 8.2 | 9.4 | 9.2 |
| Total Agricultural GDP (K mn - current prices) | 84.8 | 99.2 | 107.6 | 110.0 | 110.0 | 117.8 | 124.8 |
| % | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Malawi Government, N.S.O., Malawi Statistical Yearbook 1973 (Zomba: Government Press, 1973), Table 20.1, p. 176.

MAP 1.2

RURAL DEVELOPMENT PROJECTS




1. Karonga Rural Development Project
2. Vipya Pulpwood Forests
3. Nkhata Bay Integrated Rural Development Project
4. Kawalazi Tea Development Area
5. British Irrigated Rice Project
8. West Mzimba Land Utilization Project
9. Mbawa Ninde
10. Kasungu Flue Cured Tobacco Growers Scheme
12. Lilongwe Land Development Program
13. Central Region Lake-shore Development Project
14. Bwanje Valley Cotton Development Area
15. Gochi/Neno Potato Area
16. Kasinthula Irrigation Project
17. Thyolo/Mulanje Irrigated Tea Areas
18. Lower Shire Valley Development Project
19. Lower Shire Valley Irrigation Project
20. Elephant Marsh
21. Sucoma Sugar Estate

a strengthening of existing agriculture and natural resources extension work throughout the Northern Region. The Kawalazi Tea Development Area is a small holder tea project. The West Mzimba Land Utilization Project is a pilot project seeking to co-ordinate crop farming and animal husbandry. Mbawa Minde Project is a small project designed to provide a new source of income in an area where opportunities are limited. (Minde is a flower from which an essential oil is extracted.) The largest development project in the Northern Region is the Vipya Pulpwood Project which will provide the development of a pulp and board industry at Chinteche.

In the central Region post-independence development emphasis has been on the comprehensive Lilongwe Land Development Program which involves intensive extension efforts, rural credit, conservation works and infrastructure, and land tenure registration, all designed to secure a ten-fold increase in maize production and a doubling of groundnut production. The most imaginative aspect of the attempt to spread development more evenly is the creation of a new capital city at Lilongwe. This development involves the expenditure of approximately K50 million over a period of ten years which will result in the creation of a new economic growth point which is not only in the centre of the country but is also surrounded by areas of high potential agricultural land which is being exploited by the Lilongwe Land Development Program. To the north of Lilongwe the Kasungu Flue-Cured Tobacco Growers Scheme, initiated by the Colonial

Development Corporation, is being expanded in size and scope. In the central lakeshore region, a comprehensive project, the Central Region Lakeshore Development Project, has the principal aim of increasing cotton production and related health and community development. To the north is the British Irrigated Rice Project, a large-scale feasibility study, field trials, and experimental program for a future major project. The Bwanje Valley Cotton Development Area is a possible future development area which will use pumped lake water for irrigation. The Gochi/Neno Potato Area has potential for development.

In the Southern Region, development efforts consist of increasing tea production and acreage by using irrigation during the dry season in the Thyolo/Mulanje tea areas. The lower Shire region (south of Blantyre) has received development efforts in the form of a sugar estate at Nchalo (Sucoma Estate). The Lower Shire Rainfed Cotton Project and the Kasinthula Irrigation Project are also associated with commercial fish-farming. The Lower Shire Valley Irrigation Project, which would include control of the Elephant and Ndindi Marshes, shows potential for the development of an irrigation project.

## Outline of the Study.

Chapter II of this study contains a review of general distributional theories with relevance to developing countries

in general and to Malawi in particular and to the problem of measuring income distribution disparity. In lieu of an income distribution theory which can be used for quantifying income distribution inequality, Chapter III outlines some of the common summary measures of income distribution inequality and emphasizes the welfare implications of each measure. Chapter IV gives a description of the survey data used in the derivation of the 1968/69 rural cash income distribution in Malawi. The results of the measurement are presented in Chapter V, and the conclusions and recommendations in Chapter VI.

# CHAPTER II

## INCOME DISTRIBUTION AND ECONOMIC THEORY

The problem of income distribution has been studied by economists in various fashions for capitalist type economies since the beginning of economics. Classical economists examined the functional nature of income distribution while socialists stressed the conflicts between the rich and the poor. Econometricians have examined the quantitative distribution of national income among individuals and those with a sociological leaning have stressed sociological, economic, geographic and ethnic factors in income distribution studies. However, the problem of income distribution in underdeveloped economies such as Malawi has remained relatively in the dark. This chapter surveys the relationship between economic development and income distribution in order to throw light on the relevance of distributional theories to developing countries such as Malawi and also to determine the derivation of measures of personal income distribution.

### General Theories of Income Distribution

The classical theory of distribution as stated by Ricardo has been cited as the attractive classical approach

to developing countries because it deals with economies where industrialization has just started.[1] The Ricardian framework assumes an unlimited supply of labour at the subsistence wage and divides the product into subsistence wage, profits and rent. In the long-run the system reaches a steady position where profits disappear and per capita income remains constant.

The approach is useful as a conceptual framework since it deals with a predominantly agricultural economy with unlimited labour supply, and developing countries such as Malawi have been classified as agricultural with unlimited supplies of labour in economic literature. Other than that, the theory is irrelevant for the problem of measuring personal income distribution since Ricardian distributional theory is more concerned with factor shares than personal income distribution. In addition the theory is irrelevant for many aspects of developing countries. In Malawi, for example, the agricultural production occurs mostly on communal land in contrast to the capitalistic system of landlords; and wages form a relatively small portion of rural incomes. Remittance of money by those working in neighbouring countries and urban centres within the country form a large portion of rural incomes in Malawi and may prove a

---

[1] R. Gendarme, "Reflections on the Approaches to the Problems of Distribution in Underdeveloped Countries," in J. Marchal and B. Ducres, eds., The Distribution of National Income (New York: St. Martin's Press, 1968), p. 362.

favourable factor to personal income equalization and growth. However, Ricardo's approach does not allow for such earnings.

The socialist approach spearheaded by Marx "employs a Ricardian labour theory of value to diagnose exploitation of workers, perpetuated by stagnant wages held down by a surplus army of labour... and a relentless attempt of capitalists to maintain their profit rates in the face of capital accumulation through labour displacing innovations."[1] Marx predicted a collapse of the system in the long-run due to declining wages and the poverty faced by workers while profits accumulate to capitalists. Building on the Marxian exploitation view, Kalecki[2] came up with a monopoly power model which showed that "the greater the prevalence of monopoly conditions, the greater will be the share of monopoly profits in the economy."[3]

The Marxist approach seems applicable to underdeveloped economies in explaining certain values and mechanisms. One can, for example, characterize the exploitation of under-

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[1] W.R. Cline, "Distribution and Development: A Survey of Literature," Journal of Development Economics, 1 (February, 1975), p. 361.

[2] M. Kalecki, "The Distribution of the National Income," in The American Economic Association, Readings in the Theory of Income Distribution (Homewood: Richard D. Irwin, Inc., 1951), pp. 197-217.

[3] W.R. Cline, "Distribution and Development: A Survey of Literature," p. 364.

developed economies by the colonial governments or the present clash between rich and poor nations using this approach. However, the division of society into workers and capitalists does not seem to apply to underdeveloped situations. In Malawi, for example, the majority of the people in rural areas are self-employed and own land (customary tenure).

The Kalecki approach to Marxian theory of exploitation has explanatory value to underdeveloped economies due to the narrow markets which characterize most of them. In Malawi, for example, the Agricultural Development and Marketing Corporation has monopoly power in the purchase of certain crops from rural areas. There is no reason why the corporation could not pay farmers very low prices and earn very high revenue from the export of the crops. While the division of rural society in Malawi into classes can be rejected it appears that the pauperization of the rural people due to monopoly power is much more difficult to reject.

Another major school of distributional theory centers around human capital models. One approach is Mincer's human capital model[1] which "is based on the idea that occupations requiring longer training periods must necessarily pay higher earnings to compensate for the foregone

---

[1] J. Mincer, "Investment in Human Capital and Personal Income Distribution," Journal of Political Economy, 66 (August, 1958), pp. 281-302.

income during training."[1] The major shortcoming of the model in the context of underdeveloped economies is:

> ...the failure to acknowledge a reverse causation: (a) family background determines level of schooling; (b) given the state of the economy there is certain distribution of high and low paying jobs with remuneration determined by a combination of status and marginal productivity considerations; (c) the education filter screens out a limited number of candidates to be placed in the limited number of high income jobs.[2]

Nevertheless, Mincer's approach explains some of the observed inequalities in incomes between the educated and the uneducated in Malawi. Since education is just one aspect of sociological status in society, one can carry the theory a step further and try to explain income distribution on the basis of social classes, ideological and political factors. The results would very much depend on how clearly one can define social factors so as to bring out the dominating factors which account for the unequal distribution of income.

## Theories Relating Distribution and Development

The problem of distribution and growth has been studied from two approaches: (a) the impact of economic

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[1] W.R. Cline, "Distribution and Development: A Survey of Literature," pp. 365-366.

[2] Ibid., p. 366.

development on income distribution, and (b) the impact of distribution on economic development. The neoclassical approach hypothesized that income distribution would equalize overtime. And several empirical studies appeared to support the hypothesis by indicating that the size distribution of family income is more unequal in underdeveloped than in developed countries.[1] A number of authors have argued, however, that income distribution becomes more unequal with growth, especially in the early stages of development when asset accumulation among the rich is highest and both economic and political power among the poor is minimal.

The orthodox argument to the question of the distributional impacts on economic development led to the hypothesis that income inequality generates growth through savings and capital accumulation. Myrdal[2] has argued that income inequality leads to a decline in growth, contrary to the orthodox hypothesis. His argument, which seems to apply to underdeveloped countries, is that income inequality

---

[1] Simon Kuznets, "Quantitative Aspects of the Economic Growth of Nations: VIII, Distribution of Income by Size," Economic Development and Cultural Change, 11 (January, 1963), T. Morgan, "Distribution of Income in Ceylon, Puerto Rico, the United States, and the United Kingdom," The Economic Journal, 63 (December, 1953) and I.G. Kravis, "International Differences in the Distribution of Income," Review of Economics and Statistics, 42 (November, 1960).

[2] G. Myrdal, Asian Drama: An Inquiry into the Poverty of Nations (New York: Pantheon, 1968).

leads to an unhealthy society, especially among the poor due to lack of purchasing power. Other economists have stressed the potential demand effects of income distribution on economic growth. They have argued that a reduction in income inequality would reduce imports by cutting luxury goods imports and opening economies of scale in the production of the basic goods. It remains a matter of empirical research to assert the direction of the effects of income distribution on growth and vice versa.

In the absence of a consensus on a theory of income distribution and economic development applicable to underdeveloped economies in general and Malawi in particular, it may be possible to postulate particular policies with certain structures that would make income distribution more even. Most of the income distribution theories reviewed above shed some light on certain aspects of the problem of income distribution in underdeveloped economies. In the sections which follow an attempt will be made to isolate a method of choosing alternative ways of bringing about redistribution as well as a method of measuring the present level of income distribution in Malawi.

## Income Distribution and Welfare Economics

### Utilitarian Welfare Economics

Problems of choice between alternative ways of bringing about a given distribution of income have been studied

in welfare economics for a long time. Under utilitarian welfare economics, social welfare was conceived as the sum total of individual happiness or welfare. And when Bentham[1] wrote that the happiness of society was equivalent to the sum total of the happiness of individuals in the society, he laid down the guiding principle of the right policy, the greatest happiness principle.

The term welfare or happiness implies expression and satisfaction of all the demands of human wants including political stability. Welfare is not always associated with income or the pleasures which income brings. An increase in income may not necessarily result in more welfare or happiness for an individual or the society especially if it is not accompanied by removal or reduction of those factors which tend to reduce happiness such as disease, hunger and ignorance. The application of Bentham's postulate to Malawi means that the individual demands of human wants should form the main criteria for judging individual and social welfare. However, Bentham's principle does not address itself to the problem of measuring individual demands of human wants which form the basis of social welfare.

Following Bentham's principle of the greatest happiness, welfare economics developed along the lines of attempt-

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[1] J. Bentham, Introduction to the Principles and Legislation (Oxford: Clarendon Press, 1823).

ing to find conditions which would maximize the happiness of society. The first major positive criterion for increase or decrease in social welfare was formulated by Vilfredo Pareto[1] when he defined a position of maximum ophelimité (utility) as one where no further change in production and income distribution could bring about any further benefits to society assuming perfect competition and the absence of externalities. The criterion was developed with the aid of Edgeworth's indifference curves and the notion of tangency of the indifference curves was used to indicate the position of a Pareto optimum (equilibrium in production and exchange).

Suppose there are two crops, maize (M) and cotton (C), both being produced by two individuals, A and B. Given the preferences of the two individuals for maize and cotton, their utility indifference curves can be drawn in an Edgeworth-box diagram (Diagram 2.1). The length of the base equals the total quantity of maize and the height equals the total stock of cotton produced by A and B. Using the south-west corner $O_A$ as the origin, the quantities of maize and cotton produced by A are measured by $O_AM_A$ and $O_AC_A$, respectively. Using the north-east corner $O_B$ as the origin, the quantities of maize and cotton produced by B are measured by $O_BM_B$ and $O_BC_B$, respectively. Individual

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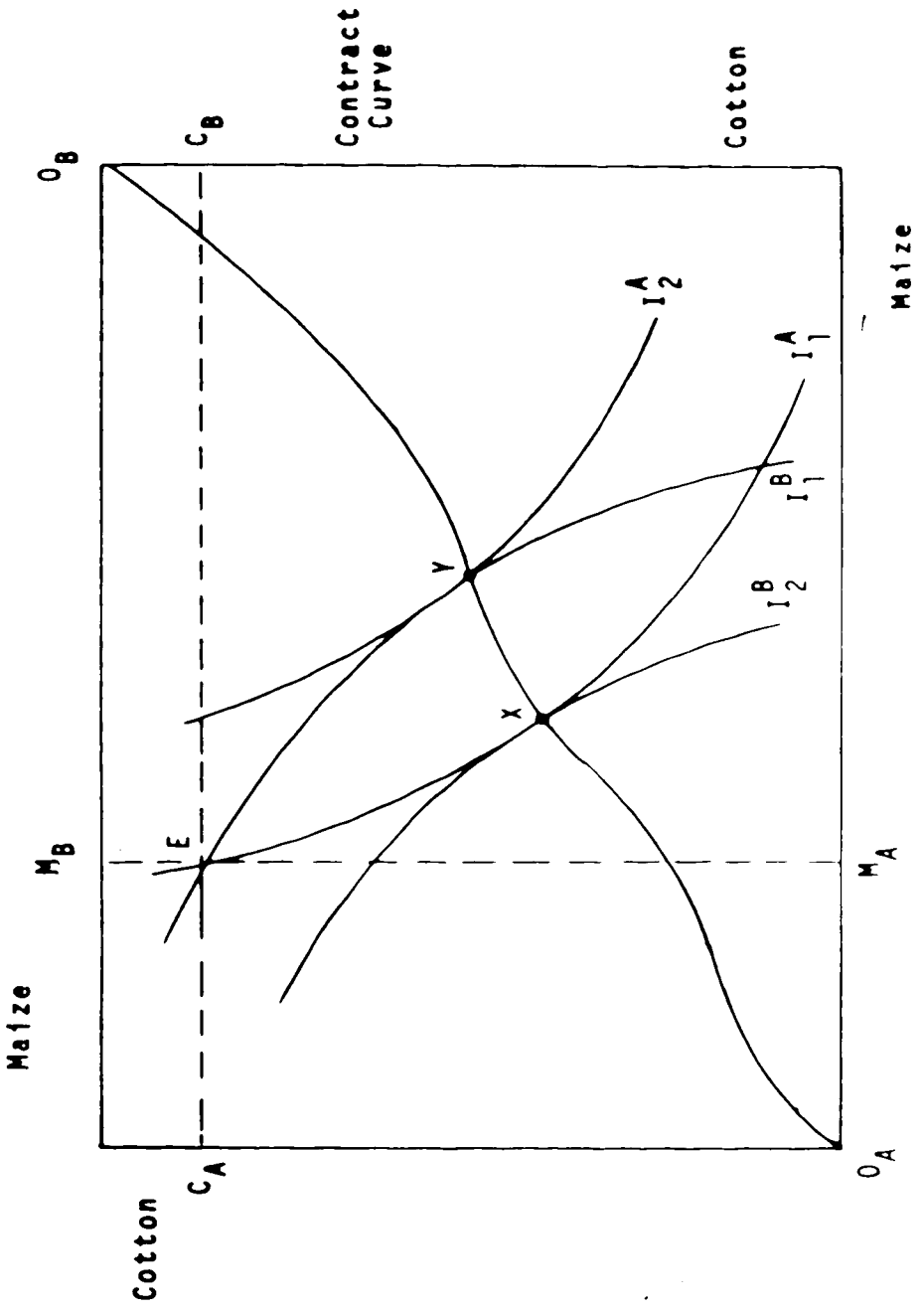
[1] V. Pareto, Manual of Political Economy, translated by Ann S. Schwier, edited by A.S. Schwier and A.N. Page (New York: Augustus M. Kelley, 1971).

DIAGRAM 2.1

AN EDGEWORTH-BOX DIAGRAM SHOWING PARETO OPTIMAL POSITIONS



A's utility curves are drawn using $O_A$ as the origin while B's indifference map is drawn using $O_B$ as the origin.

Starting from the initial allocation of maize and cotton between A and B, represented by point E in Diagram 2.1, it is possible to redistribute maize and cotton through exchange to point Y or point X along either indifference curve $I_1^B$ or $I_1^A$, respectively, such that at least one of the two individual's utility of maize and cotton increases without incurring losses to the utility of the other. Points Y, X and many other similar points which form a locus of points giving rise to the famous Edgeworth contract-curve $O_AO_B$ (see Diagram 2.1) are regarded as Pareto optimal positions.

The simple illustration of a Pareto optimum above does not offer much insight into the analytical procedure for the problem of measuring individual and social welfare for Malawi. In the first place, the above illustration shows that a Pareto optimum is not a unique general social welfare optimum position. The simple illustration in Diagram 2.1 gives at least two Pareto optimum positions, Y and X, and as pointed out above, there are many more Pareto optimum positions all along the contract curve. Secondly, the assumption of perfect competition associated with the derivation of a Pareto optimal position is hardly attainable in Malawi.

In the third place, the criterion is not helpful in the measurement of individual welfare, which according to

Bentham forms the basis of social welfare. Interpersonal comparisons of welfare are sidestepped by limiting the application of the criterion to cases where some people gain and no one loses and where there are no externalities. For practical purposes there are hardly any economic or social policies in the present complex societies of Malawi which benefit some and harm no one. The scarcity of such policies in the field of economic development is one of the reasons for the attempt to quantify the distributional effects of economic development. Finally, the exclusion of externalities is supported neither by a priori reasoning nor empirical evidence. In more cases than not, individual satisfaction or happiness in Malawi depends on other individual's happiness. The redistribution of maize and cotton from E to either X or Y (Diagram 2.1) can therefore no longer be regarded as necessarily a Pareto optimum because the redistribution would alter the utility derived from maize and cotton by the two individuals. Such a change means altering the shapes of the indifference curves which may result in a Pareto optimum position quite different from X or Y.

The next major development in welfare economics based on utility theory was by Professor Pigou. He took over the Benthamite doctrine of social welfare, but for the first time, economic welfare, defined as that part of social welfare which "can be brought directly or indirectly

into relation with the measuring rod of money,"[1] was distinguished from social welfare. Pigou's main concern was "with the causes of an increase in welfare with a view to indicating the direction in which and the ways by which improvement could come."[2] Although he was less concerned with formulating maximum conditions than Pareto, his treatment of welfare economics was a logical sequel to Pareto optimality as evidenced by the following proposition

> Any cause which, without the exercise of compulsion or pressure upon people to make them work more than their wishes and interests dictate, increases productive efficiency, and, therewith, the average volume of the national dividend [income], provided that it neither injures the distribution, nor augments the variability of the country's consumable income, will in general increase economic welfare.[3]

Pigou's proposition fitted with Marshall's theory of consumer demand where "it was thought that little could be said about the behaviour of prices if demand was not determined by the behaviour of rational individuals, and a rational man, i.e., the 'economic man', was one who tried

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[1] A.C. Pigou, The Economics of Welfare (4th edition, London: Macmillan and Company, 1932), p. 11, cited by I.M.D. Little, A Critique of Welfare Economics (2nd edition, London: Oxford University Press, 1957, Reprint ed. 1965), p. 9.

[2] M. Dobb, Welfare Economics and the Economics of Socialism (Cambridge: Cambridge University Press, 1969), p. 27.

[3] A.C. Pigou, The Economics of Welfare (London Macmillan and Company, 1920), p. 47, cited by M. Dobb, Welfare Economics and the Economics of Socialism, p. 28.

to maximize his satisfaction."[1] Both Pigou's proposition and Marshall's theory of demand appear to have been based on the utility theory of consumers' behaviour where the maximization of each individual's utility was a necessary condition of achieving a maximum total utility given a set of production factors.

Pigovian welfare economics introduced another [illegible] to the problem of measuring individual and social welfare. The division of human welfare into economic or material welfare and non-economic welfare is intelligible but [illegible] cut for both capitalist developed countries and developing countries such as Malawi. "The relative importance which should be attached to economic and non economic welfare, and the probable effects of changes in economic welfare on welfare as a whole, have been much disputed"[2] and the dispute is still valid today. Despite the dispute some economists have argued that economic welfare is important for its own sake and as a means for increasing social welfare. Income has therefore been regarded as the means for economic welfare. Using Bentham's principle, one can now say that increase in an individual's income, other things being equal, is likely to increase an individual's happiness, [illegible]

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[1] I.M.D. Little, A Critique of Welfare Economics, p. 10.

[2] H. Dalton, Some Aspects of the Inequality of Income in Modern Communities (2nd edition, New York [illegible] Co., 1925), p. 9.

social welfare as a whole. From the preceding principle one can argue that personal income inequality in society would imply social welfare inequality for different individuals other things remaining equal. And by applying the law of diminishing marginal utility, "the case against large inequalities of income is that the less urgent needs of the rich are satisfied, while the more urgent needs of the poor are left unsatisified."[1]

## The New Welfare Economics

In an attempt to extend welfare comparisons to situations where some people gain and others lose as a result of policy changes, Kaldor and Hicks came up with the principle of compensation. In its original formulation by Kaldor the principle states:

> In all cases, therefore, where a certain policy leads to an increase in physical productivity, and thus, of aggregate real income, the economist's case for policy is quite unaffected by comparability of individual satisfactions since in all such cases it is possible to make everybody better off than before, or at any rate to make some people better off without making anybody worse off.... In order to establish his case, it is quite sufficient for him to show that even if all those who suffer as a result are fully compensated for their loss, the rest of the community will still be better off than before[1].... This principle, as the reader will

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[1] Ibid., p. 10.

[2] N. Kaldor, "Welfare Propositions of Economics and Interpersonal Comparisons of Utility," The Economic Journal, 49 (September, 1939), p. 550, cited by I.M.D. Little, A Critique of Welfare Economics, p. 88.

> observe, simply amounts to saying that there is no interpersonal comparison of satisfactions involved in judging any policy designed to increase the sum total of wealth just because any such policy could be carried out in a way as to secure unanimous consent.[1]

Kaldor and Hicks did not insist that compensation must actually be paid nor did Barone[2] when he first suggested the notion of a compensating payment in 1908. If the losers are actually compensated by the gainers then we are right back to the Pareto criterion. If payment is made, the principle raises questions involving interpersonal comparisons. For example, one has to determine:

(a) Who is to be compensated;

(b) Who is to compensate;

(c) How much is the loss;

(d) How much is the gain; and

(e) Who is to assess the loss and gain.

If compensation is not paid, the use of potential compensation implies accepting the prevailing distribution of income as a measure of the relative strength of feelings of gainers and losers without actually measuring the prevailing personal income distribution. Following Little, "we do not believe that any definition of an increase in wealth, welfare, efficiency or real social income which

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[1] Ibid.

[2] E. Barone, "The Ministry of Production in the Collectivist State," in Collectivist Economic Planning, F.A. Hayek, ed. (London: Routledge, 1935).

excludes income distribution is acceptable."[1]

The best proposal so far for evaluating welfare is Bergson's[2] social welfare function which includes explicit value judgments about the distribution of income. A social welfare function for Malawi can be thought of as an ordinal index of society's welfare and a function of the utility levels of all individuals. Among the variables to be indexed would be variables like:

> ... the amounts of each of the factors of production, other than labour, employed in the different units, the amounts of the various commodities consumed, the amounts of the different kinds of work done, and the production unit for which this work is performed by each individual in the community during that period of time.[3]

Society's goal is to maximize the social welfare function subject to given constraints on production. Income distribution is accounted for by making value judgments in the social welfare function which depend on the prevailing values of society and the economist making the value judgments.

Despite its elegant formulation and the first sight impression of expressing the society's most desirable dis-

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[1] I.M.D. Little, A Critique of Welfare Economics, p. 92.

[2] A. Bergson, "A Reformulation of Certain Aspects of Welfare Economics," Quarterly Journal of Economics, 52 (February, 1938), pp. 310-334.

[3] Ibid., p. 311, cited by J. Rothenberg, The Measurement of Social Welfare (Englewood Cliffs: Prentice-Hall, Inc., 1961), p. 8.

tribution of welfare, the social welfare function approach has not proved useful in the measurement of personal income distribution nor social welfare. The determination of the shape of a social welfare function which "amounts to determining the relative weights attached to each individual's preferences when these are aggregated into the social preference"[1] has proved very difficult. Arrow[2] has demonstrated that, in general, a social welfare function cannot be constructed such as to fulfill five reasonable requirements[3] without leading to a contradiction.

## Conclusion

This review of income distribution and economic theory has brought out a number of important points about the relevance of economic theories of distribution to underdeveloped countries in general and Malawi in particular. Most of the

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[1] T. Scitovsky, Papers on Welfare and Growth (Stanford: Stanford University Press, 1964), p. 185.

[2] K.J. Arrow, Social Choice and Individual Values (2nd edition; New York: Wiley and Sons, Inc., 1963; Reprint ed., 1966), p. 59.

[3] Arrow's five reasonable requirements are: (1) social preferences must satisfy conditions of completeness, reflexivity and transitivity; (2) social preferences should be responsive to individual values; (3) the most preferred state must be in a set of alternatives independent of the existence of other alternatives; (4) social preferences must not be imposed independently of individual preferences; and (5) the social preferences must not totally reflect the preferences of any single individual.

general theories of income distribution explain some but not all aspects of income distribution in underdeveloped economies. The major theoretical flaws arise from the fact that most of the theories were developed for capitalistic economies, not for underdeveloped economies. Nevertheless, the standard economic theory reviewed has established the possible relationships between income distribution and economic growth.

The attempt to isolate a theory for selecting alternative policies for bringing about desired income distributions has established the relationship between individual welfare and personal income distribution on one hand, and social welfare on the other. However, welfare economics stops short of a practical analytical procedure by which personal income distribution or individual welfare can be quantified. "If we assume that welfare distributions affect the social ordering of social states but profess to know nothing about such distributions, then our measures of potential welfare change tell us very little"[1] because:

> ...in a world of more than one commodity, there is no unequivocal meaning to comparing total production in any two social states save in terms of some standard of value which makes the different commodities comparable; and usually such a standard of value must depend on the distribution of income.

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[1] Jerome Rothenberg, The Measurement of Social Welfare (Englewood Cliffs: Prentice-Hall, Inc., 1961), p. 103.

> In other words, there is no meaning to total output independent of distribution.[1]

In the next chapter a number of the common measures of income inequality will be reviewed in an attempt to identify a practical procedure for measuring personal income distribution in Malawi.

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[1] K.J. Arrow, Social Choice and Individual Values, pp. 39-40, cited by J. Rothenberg, The Measurement of Social Welfare, p. 102.

# CHAPTER III

# MEASURES OF INCOME INEQUALITY

## Social Welfare and Inequality Measures

Measuring and comparing income distribution is predicated on a belief in the functional relationship between personal income distribution and social welfare. The previous chapter has established that hypothesis but theory has yet to elaborate on explicit specificiation of the social welfare function relating income distribution to social welfare.

In the absence of welfare criteria which can treat income distribution as an independent variable in the determination of welfare, economists have made use of various statistical measures of inequality when measuring and comparing personal income distribution. The measurement of the level of income inequality has been made possible by applying statistical measures on the size distribution of incomes against some chosen norm of equality, usually perfet equality which reflects a preference for equal distribution. Also implied in all such statistical measures of income inequality are assumptions, which would be made explicit, about the relative weights attached to income at different income size levels.

As early as 1920, Dalton, following the lead of Pigou, suggested that a proper measure of income inequality should be sensitive to any transfer of income from a poorer person to a richer person or vice versa, other things being equal.[1] More recently Atkinson[2] has suggested a second criterion which is concerned with the effect of the overall level of income distribution on the value of the measure of income inequality. According to the criterion, if the income distribution in region A is simply a scaled up version of that in region B, i.e., identical frequency distributions but a higher mean level of income associated with distribution A, then the measure of income inequality should yield the same value for both distributions; that is, the measure should display constant (relative) inequality-aversion, if the level of inequality in the two regions is considered the same. On the other hand, if you argue that distribution A is more unequal (equal) than distribution B, the measure of inequality should yield a higher (lower) value for distribution A than for distribution B or, following Atkinson's terminology, the measure should exhibit increasing (decreasing) inequality-aversion. We shall refer to

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[1] Hugh Dalton, "The Measurement of the Inequality of Incomes," The Economic Journal, 30 (September, 1920), p. 351; A.C. Pigou, Wealth and Welfare (London: Macmillan, 1912), p. 24, cited by A.K. Sen, On Economic Inequality (Oxford: Clarendon Press, 1973), p. 27.

[2] Anthony B. Atkinson, "On the Measurement of Inequality," Journal of Economic Theory, 2 (September, 1970), p. 351.

this criterion as Atkinson's principle of inequality-aversion and together with the Pigou-Dalton principle of transfers, these criteria will be used to evaluate the usefulness of statistical inequality measures reviewed in the following sections. For the specific purpose of measuring personal income distribution in Malawi an ideal measure in terms of the Pigou-Dalton principle should be more sensitive to transfers affecting the lower income groups than the higher income groups because the majority of households in Malawi fall under the lower income classes. In terms of Atkinson's principle of inequality-aversion, an ideal measure should exhibit constant inequality aversion because a proportional increase to all incomes does not necessarily lead to an increase in the social welfare of the people.

## Some Common Measures of Inequality

### The Lorenz Curve

The Lorenz curve is a graphical presentation of the cumulative percentages of the households arranged from the poorest to the richest on the horizontal axis and the cumulative percentage of total income enjoyed by each group of households on the vertical axis. Zero percent of the households enjoy zero percent of total income while 100 percent of the households enjoy 100 percent of the income. The Lorenz curve therefore runs from position (0,0) to (100,100) on the graph. When each household has exactly the same

income the Lorenz curve is simply a straight line running from position (0,0) to (100,100), signifying perfect equality in the distribution of income between households. When the lower income groups enjoy a proportionally smaller income share compared to their proportion of the total number of households, the Lorenz curve lies below the line of perfect equality, signifying inequality in the distribution of incomes between households (Diagram 3.1).

The Lorenz curve is a useful device for displaying and comparing income distributions of different areas, periods, occupations or even different countries without specifying the social welfare function. Curves closest to the line of perfect equality signify a more equal distribution of income than curves furthest from the line of perfect equality.

When two curves cross neither distribution can be said to be more equal than the other unless the welfare functions describing each Lorenz curve are defined explicitly. The conclusion from the last chapter was that theory has yet to elaborate on the explicit specification of a social welfare function. Only very limited conclusions concerning any two distributions whose Lorenz curves cross can be made. For example, in Diagram 3.2 the level of income inequality is higher in distribution A than B at the lower income levels and vice versa at the higher income levels. On the other hand, definite conclusions about the inequality of income between distributions A and C or B and

**DIAGRAM** 3.1

**A LORENZ** CURVE

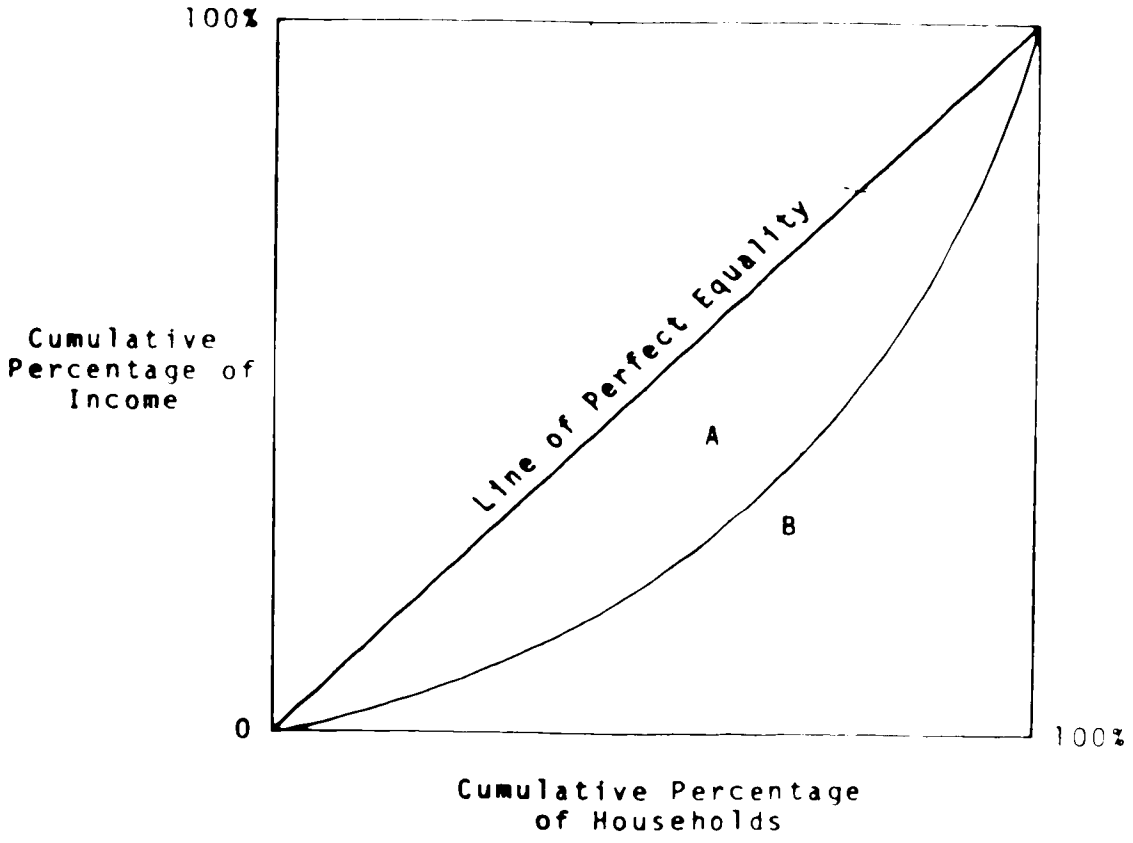
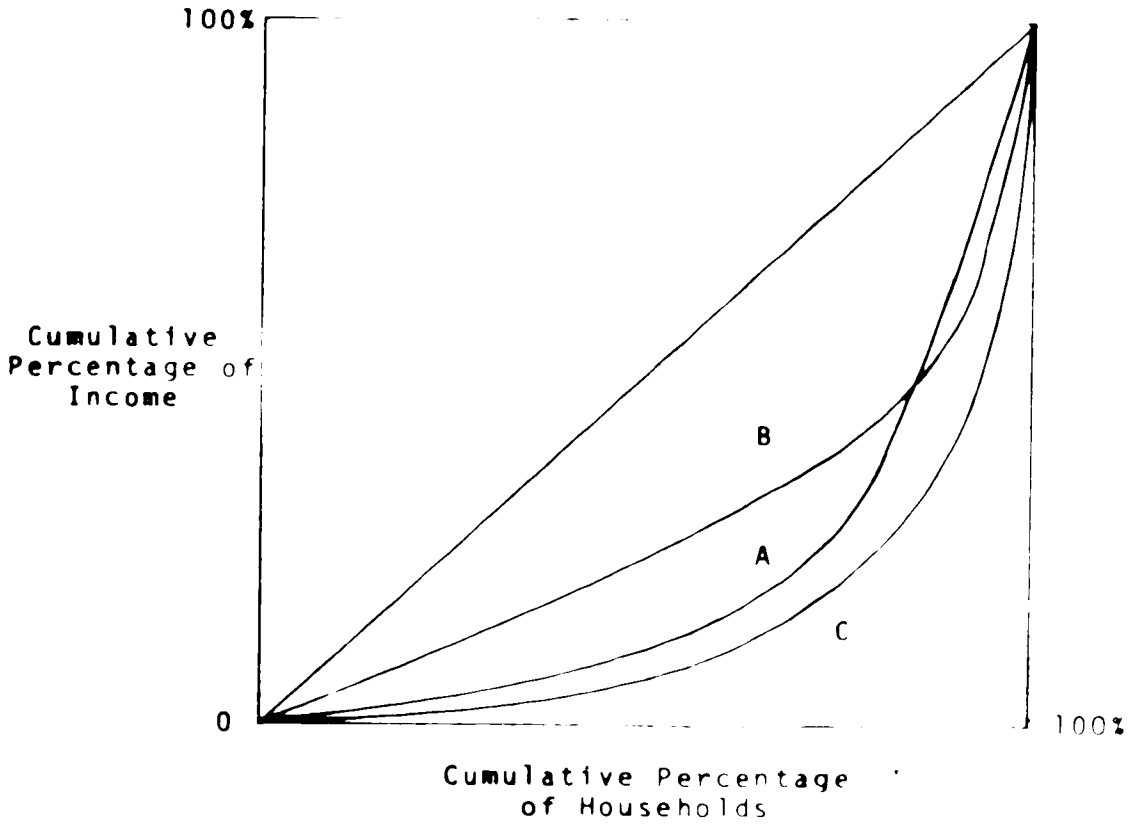


**DIAGRAM** 3.2

INTERSECTING LORENZ CURVES



C can be reached since neither distribution A nor B crosses with distribution C, subject to the condition that the distributions are ranked independently of the average levels of income. However, Sen[1] has pointed out that one can never be certain that Lorenz curves do not cross, even if they appear not to do so when constructed from group data because group data do not show the distribution within groups.

The Lorenz curve is equally responsive to transfers of incomes between poorer and richer income groups at all income levels. Such a property makes the Lorenz curve unsuitable for the problem of measuring income distribution in Malawi where we would like to attach more weight to income transfers affecting the lower income groups than those affecting higher income groups. On the other hand, the Lorenz curve exhibits constant inequality-aversion, i.e., if distribution A is simply a scaled up version of distribution B, both distributions would yield identical Lorenz curves. The Lorenz curve therefore meets the inequality-aversion requirement for an ideal measure of income distribution in Malawi. However, the problem of comparing such distributions is complicated by the different mean income levels if one wishes to take mean incomes into account. From the welfare point of view the problem lar

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[1] A.K. Sen, On Economic Inequality (Oxford: Clarendon Press, 1973), p. 58.

be overcome by attaching welfare weights to the absolute sizes of the incomes so that the comparisons of the [illegible] curves can be made without taking account of the real income levels.

The Range

The range [illegible] compares the extreme incomes [illegible] bution. It is defined as the ratio of the gap between the highest income level ($\text{Max}_i Y_i$) and the lowest income level ($\text{Min}_i Y_i$) to mean income[1]

$$E = \frac{\text{Max}_i Y_i - \text{Min}_i Y_i}{\mu}$$

If the distribution of income is absolutely equal, [illegible] and when all the income is received by one person [illegible] the range is equal to the number of people in [illegible] major disadvantage of the range for the problem of measuring [illegible]

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[1] Ibid., p. 24. For grouped data the range is defined as:

$$E = \frac{\text{Max}_j \frac{Y_j}{n_j} - \text{Min}_j \frac{Y_j}{n_j}}{\mu}$$

where $Y_j$ is the total income accruing to the [illegible] group, $n_j$ is the number of households in the [illegible] group, $\mu$ is the mean level of income for all individuals

income distribution in Malawi is that it is not sensitive to the Pigou-Dalton principle of transfers whenever such transfers do not affect the extreme values of the distribution.

The Relative Mean Deviation

The relative mean deviation (M) examines the whole distribution instead of just the extreme values. It is defined as the ratio of the sum of the absolute values of the differences between all incomes and the total income:[1]

$$M = \frac{\sum_{i=1}^{n} |Y_j - \mu|}{n\mu}$$

where n equals the number of individuals. [illegible] would yield an M = 0, and with all income [illegible]

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[1] Ibid., p. 25. [illegible] grouped data the relative mean deviation can be defined as:

$$M = \frac{\sum_{j=1}^{m} n_j \left| \frac{Y_j}{n_j} - \mu \right|}{N\mu}$$

where the number of groups is m, the number of households in the $j^{th}$ group is $n_j$, the number of households in all groups is N, the total income accuring to the $j^{th}$ group is $Y_j$, and the mean level of income for all groups is $\mu$.

son M = 2(n-1)/n. The relative mean deviation is not sensitive to transfers of incomes between people on the same side of the mean income. The measure may therefore fail to meet the criteria of responding to lower income transfers to a greater degree than for higher income transfers.

The Variance

The variance (V) is defined as a ratio of the sum of squared differences between all incomes and the mean to the number of people.[1]

$$V = \frac{\sum_{i=1}^{n} (Y_j - \mu)^2}{n}$$

The variance responds to the Pigou-Dalton principle of transfers. For example, a transfer of incomes from richer people

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[1] Ibid., p. 27. For grouped data the variance is defined as:

$$V = \frac{1}{N} \sum_{j=1}^{m} n_j (Y_j/n_j - \mu)^2$$

where the number of groups is m, the number of households in the $j^{th}$ group is $n_j$, the number of households in all groups is N, the total income accuring to the $j^{th}$ group is $Y_j$, and the mean level of income for all households is $\mu$. See D.G. Horner, "Income Distribution in Alberta Agriculture" (Unpublished M.A. Thesis, University of Alberta, Edmonton, 1975), p. 52.

to poorer people leads to a decline in the value of V, i.e., indicating a reduction in income distribution inequality. However, the measure does not exhibit the desirable characteristic of weighing transfers at the lower end more heavily than those at higher income levels. With regard to Atkinson's principle of inequality-aversion, the variance exhibits increasing inequality-aversion, i.e., the value of V rises with proportional additions to all incomes which raise the mean income level. Unless one has reason to show that proportional additions to incomes increase inequality, the increasing inequality-aversion characteristic of the variance is not desirable for the problem of measuring income distribution in Malawi.

The Coefficient of Variance

The coefficient of variation (C) is defined as the square root of the variance divided by the mean income.[1]

$$C = \frac{V^{0.5}}{\mu}$$

The coefficient of variation has the advantage of exhibiting constant inequality-aversion because it is defined relative to the mean income. With respect to the Pigou-Dalton prin-

[1] Ibid., p. 27. For grouped data the coefficient of variation is the square-root of the grouped data variance divided by the mean income per household.

ciple of transfers, the measure responds equally to transfers at all income levels. As in the Lorenz curve, the relative income levels of the people between whom the transfers occur are ignored. The measure does not, therefore, meet the requirement of weighing incomes at the lower levels more heavily than incomes at higher levels.

The Standard Deviation of Logarithms

The standard deviation of logarithms (H) is commonly defined using the arithmetic mean in income distribution literature.[1]

$$H = \left[ \frac{\sum_{i=1}^{n} (\log Y_i - \log \mu)^2}{n} \right]^{0.5}$$

It is sensitive to income transfers at all income levels and exhibits constant inequality-aversion; however, it may

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[1] Ibid., p. 29. For grouped data the standard deviation of logarithms is defined as:

$$H = \left[ \frac{\sum_{i=1}^{m} n_j (\log \frac{Y_j}{n_j} - \log \mu)^2}{N} \right]^{0.5}$$

where the number of groups is m, the number of households in the $j^{th}$ group is $n_j$, the number of households in all groups is N, the total income accuring to the $j^{th}$ group is $Y_j$ and the mean level of income per household is ..

become insensitive to transfers affecting the higher end of the income scale. Despite the insensitivity to transfers at the high income levels, the standard deviation of logarithms displays the desirable characteristics of displaying constant inequality-aversion and weighing incomes at the lower income levels more heavily than those at the higher income levels as is required for the problem of measuring personal income distribution in Malawi.

## The Gini Coefficient

The Gini coefficient (G) is the ratio of the area between the line of perfect equality (the diagonal) and the Lorenz curve (area A in Diagram 3.1) to the triangular region underneath the diagonal (A + B). If area B in Diagram 3.1 is approximately by straight lines between plotted points of the Lorenz curve, using grouped percentage data, the Gini coefficient can be estimated by the following formula:[1]

$$G = 1 - \frac{\sum_{j=1}^{m} \frac{1}{2}(R_{j+1} - R_j)(Y_{j+1} - Y_j)}{5000}$$

where $R_j$ is the cumulative percentage of households in the

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[1] D.G. Horner, "Income Distribution in Alberta Agriculture," p. 54 and J. Morgan, "The Anatomy of Income Distribution," Review of Economics and Statistics, 44 (August, 1962), pp. 281-282. See Appendix A of this study for the mathematical derivation of the above formula.

$j^{th}$ lowest income group, $Y_j$ is the cumulative percentage of aggregate income going to the $j^{th}$ lowest income group, m is the number of groups and $R_1 = Y_1 = 0$. "For eight or more groups this approximation should be quite close."[1] The value of G falls between zero and one, zero implying perfect equality and one implying that all the income is received by one household.

The Gini coefficient exhibits constant inequality-aversion and is sensitive to transfers of income but it "attaches more weight to transfers affecting middle income classes."[2] When the above linear approximation formula is used to estimate the Gini coefficient, "the value of a Gini ratio [coefficient] can be seriously biased, and conclusions drawn from ranked Gini ratios can be misleading."[3] The major biases are of two types: "(1) cell bias (both intracell and intercell) and (2) aggregation bias."[4]

Cell bias refers to the over-estimation of area B (Diagram 3.1) due to the linear approximation of the Lorenz curve by straight lines between plotted points which in the

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[1] J. Morgan, "The Anatomy of Income Distribution," p. 281.

[2] A.B. Atkinson, "On the Measurement of Inequality," pp. 256-257.

[3] R.A. Benson, "Gini Ratios: Some Considerations Affecting Their Interpretation," American Journal of Agricultural Economics, 52 (December, 1970), p. 447.

[4] Ibid., p. 444.

end leads to an under-estimation of the Gini ratio. Cell bias would not be a problem if there was a cell (group) for each household; however, it is practically impossible to analyze large populations using such a method. The usual practice is to use stratified data for the calculation of Gini coefficients and it is out of this stratification that cell bias arises. As the number of cells decreases (increases), other things being equal, the value of the Gini coefficient decreases (increases) as shown in Diagram 3.3 where two groups are combined into one. Similarly, "when large proportions of a distribution fall within one cell, the calculated Gini ratios may contain serious downward bias"[1] because a larger percentage of the distribution must be estimated by linear approximation. Cell bias can be eliminated by fitting a continuous function through all the plotted Lorenz curve points and interpolating additional points between the plotted points, and then integrating the function to find the area of inequality or Gini coefficient. However, it is doubtful whether an appropriate type curve can be fitted by least squares passing through all the data points.

Aggregation bias may also arise in the other summary measures of income inequality. It results from the aggregation process of combining heterogeneous regional or district distributions into a completely new distribution for a

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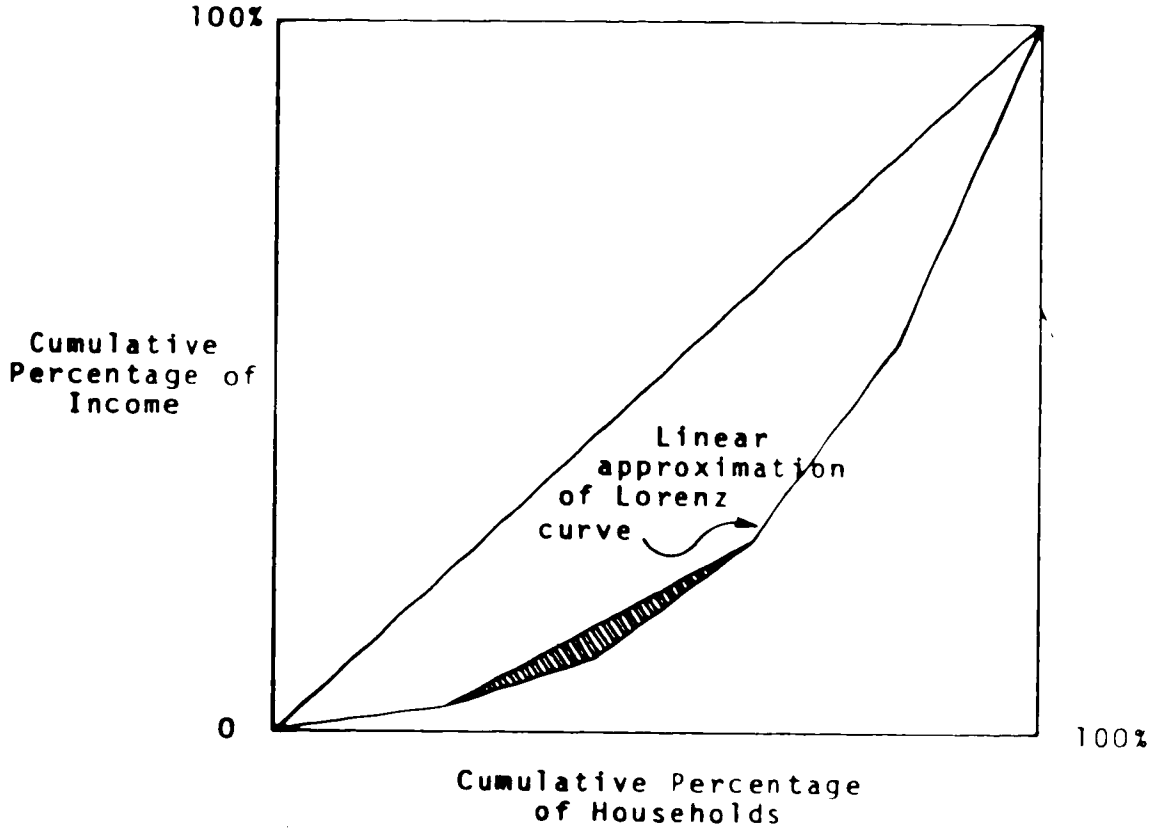
[1] Ibid., p. 446

**DIAGRAM 3.3**

GRAPHIC PRESENTATION OF DOWNWARD CELL BIAS OF THE GINI COEFFICIENT



country as a whole such that the aggregate distribution may not resemble the distributions of any region or district included in the aggregation process.[1]

Despite the difficulties encountered in calculating Gini coefficients, the results have a theoretical appeal in that the Gini coefficient depends on the differences of values between themselves and not on the spread about some arbitrary point such as the mean. However, in a more recent study, Paglin warns that the Gini coefficient (and the associated Lorenz curve) may overestimate inequality by as much as 50 percent.[2] The overestimation, as he points out, arises from the 45 degree reference line of perfect equality which overspecifies the conditions of equality when used with annual income data. These conditions require that all households must have perfectly flat age-income, regardless of age and household size. The alternative approach to the socially unrealistic 45 degree line of equality is to generate "new reference lines corresponding to explicit and reasonable definitions of equality, equity, or Pareto optimality"[3] which give a bowed reference line rather than the conventional 45 degree straight line.

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[1] Ibid.

[2] Morton Paglin, "The Measurement and Trend of Inequality: A Basic Revision," The American Economic Review, 65 (September, 1975), p. 601.

[3] Ibid., p. 599.

## Summary and Choice of Measures of Inequality

To summarize, "the degree of inequality cannot, in general, be measured without introducing social judgments"[1] because all the measures reviewed so far embody implicit judgments about the weight to be attached to inequality at different income levels. The examination of the seven common measures of inequality have shown that:

(a) The variance implies increasing (relative) inequality-aversion while all the other measures imply constant (relative) inequality-aversion;

(b) The Lorenz curve, the variance and the coefficient of variation attach equal weight to transfers at different income levels;

(c) The range is not sensitive to transfers which do not affect the extreme values of the distribution while the relative mean deviation is not sensitive to transfer on the same side of the mean;

(d) The standard deviation of logarithms weighs transfers at the lower end more heavily and the Gini coefficient attaches more weight to transfers affecting middle income classes.

The range and the relative mean deviation have been

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[1] A.B. Atkinson, The Economics of Inequality (Oxford: Clarendon Press, 1975), p. 47.

termed "more or less, non-starters" by Sen[1] because they fall far too short of the Pigou-Dalton principle of transfers and Atkinson's principle of inequality-aversion. Only the standard deviation of logarithms exhibits the two ideal characteristics for measuring income distribution in Malawi, i.e., weighing transfers affecting lower income groups more heavily than those affecting higher income groups and exhibiting constant inequality-aversion. If the variance, the coefficient of variation, the Gini coefficient and the standard deviation of logarithms could yield the same ranking of income distributions then their combined use could strengthen the measurement and comparison of income distributions and one could rely on the corroboration of several measures as Dalton suggested in 1920.[2] However, it has been shown that all four measures will give the same ranking of income distributions only if the Lorenz curve of the different distributions do not cross, otherwise they may give conflicting results.[3]

For comparison purposes the first step should therefore be to draw the Lorenz curves of the various distributions so as to determine the cases in which the summary

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[1] A.K. Sen, On Economic Inequality, p. 31.

[2] H. Dalton, "The Measurement of Inequality of Incomes," p. 361.

[3] A.B. Atkinson, "On the Measurement of Inequality," p. 253.

measures will agree and in which there is likely to be ambiguity in the ranking of the distributions. The alternative approach, given that the conventional summary measures imply certain distributional values, is to consider such values explicitly. One such approach was suggested by Atkinson in 1970.[1]

Atkinson's measure of inequality introduces distributional objectives through an explicit parameter . "This parameter represents the weight attached by society to inequality in distribution."[2] The value of , ranges from zero, where society ranks distribution solely according to total income, to infinity, where society is concerned only with the position of the lowest income group. More weight is attached to income at the lower income end than at the top end as the value of the parame[illegible]ises. Atkinson's measure of inequality (I) is defin[illegible]ollows:[3]

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[1] Ibid., p. 257.

[2] A.B. Atkinson, The Economics of Inequality, [illegible]

[3] A.B. Atkinson, "On the Measurement of Inequality, p. 257 and A.B. Atkinson, The Economics of Inequality, [illegible] The following definition of Atkinson's measure of inequality was used for the calculations in this study:

$$I = 1 - \left[ \sum_{j=1}^{m} \frac{n_j}{N} \left( \frac{Y_j}{n_j} \div \mu \right)^{1-\epsilon} \right]^{\frac{1}{1-\epsilon}}$$

where the number of groups is m, the number of households in the jth group is $n_j$, the aggregate number of households in N, the total income accuring to the jth group is $Y_j$ and the average income per household for all households is [illegible]

$$I = 1 - \left[ \sum_{j=1}^{m} f_j \left( \frac{Y_j}{\mu} \right)^{1-\epsilon} \right]^{\frac{1}{1-\epsilon}}$$

where $Y_j$ denotes the income of those in the $j^{th}$ income group (m groups), $f_j$ denotes the proportion of the households with incomes in the $i^{th}$ group, and $\mu$ denotes the mean income.

> The measure has a very natural interpretation as the proportion of the present total income that would be required to achieve the same level of social welfare as at present if incomes were equally distributed. A value of 0.12 means that we could reach the same level of social welfare with only 88 percent of the present total income. Alternatively, the [potential] gain from redistribution to bring about equality would be equivalent to raising total income by 12 percent.[1]

The measure can therefore be used "to attach some absolute measure to the degree of inequality."[2]

The role of the analyst in this case would be reduced to one of choosing the value of the parameter $\epsilon$, which is clearly a measure of the degree of inequality-aversion or the relative sensitivity to transfers at different income levels."[3] One can also consider using different values for the parameter $\epsilon$ when dealing with different income gains between the rich and the poor.

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[1] A.B. Atkinson, The Economics of Inequality, pp. 48-49.

[2] Ibid., p. 45.

[3] A.B. Atkinson, "On the Measure of Inequality," p. 257.

# CHAPTER IV

## ESTIMATION OF THE 1968/69 DISTRIBUTION OF RURAL INCOME IN MALAWI

The measurement of the distribution of income is one of the measures reviewed in the previous chapter using income data by economic classes. The data for this study were derived from the National Sample Survey of Agriculture (N.S.S.A.),[1] conducted during the period 1st November, 1968 to 30th November, 1969. This chapter describes the nature of the 1968/69 N.S.S.A., the method used to estimate the distributions of rural gross incomes and some limitations of the data.

### The Nature of the National Sample Survey of Agriculture

The 1968/69 N.S.S.A. was the first large scale agricultural survey covering traditional rural areas (land held under customary tenure) of Malawi. The sample survey area consisted of 31.4 percent of the country's rural population (Table 4.1).

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[1] Malawi Government, National Statistical Office (N.S.O.), National Sample Survey of Agriculture, 1968/69 (Zomba: Government Press, 1970).

TABLE 4.1

POPULATION BY TYPE OF AREA

| Type of Area | Total | Percent |
|---|---|---|
| Urban Area | 203,303 | 5.0 |
| Trading Centres | 18,143 | 0.4 |
| Estates | 75,528 | 1.9 |
| Missions | 19,283 | 0.5 |
| Government Stations | 16,349 | 0.4 |
| Traditional Rural Areas | 3,706,977 | 91.8 |
| All Malawi | 4,039,583 | 100.0 |

SOURCE: Malawi Government, N.S.O., Malawi 1966 Population Census, Final Report Tomes, Government Press, 1968) cited in the National Sample Survey of Agriculture 1968/69, Table A, p. v

The survey was designed to provide data for the administrative areas (3 regions and 23 districts, Map 4.1) and also for 35 of the country's natural areas selected by the Natural Resources Planning Unit. The objective of the survey was "to obtain information on the acreage of land under principal crops, the yield per acre of maize and groundnuts, and on household income and expenditure."[1] The data was needed for planning "the development of agriculture in the rural areas" and for updating "the national accounts to show patterns of income and expenditure in the monetary sector of the rural economy covered by the survey."[2]

The 1968/69 N.S.S.A. was preceded by a pilot survey which allowed "testing of procedures before the larger survey and also provided some summary data for two consecutive crop seasons."[3] The pilot survey was conducted between 1st January and 27th October, 1968, and it covered the same universe as the 1968/69 N.S.S.A. but used a smaller sample of 80 enumeration areas (E.A.'s)[4] compared to the N.S.S.A. stratified sample of 410 E.A.'s out of a universe of 1,500 E.A.'s.

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[1] Ibid., p. v.

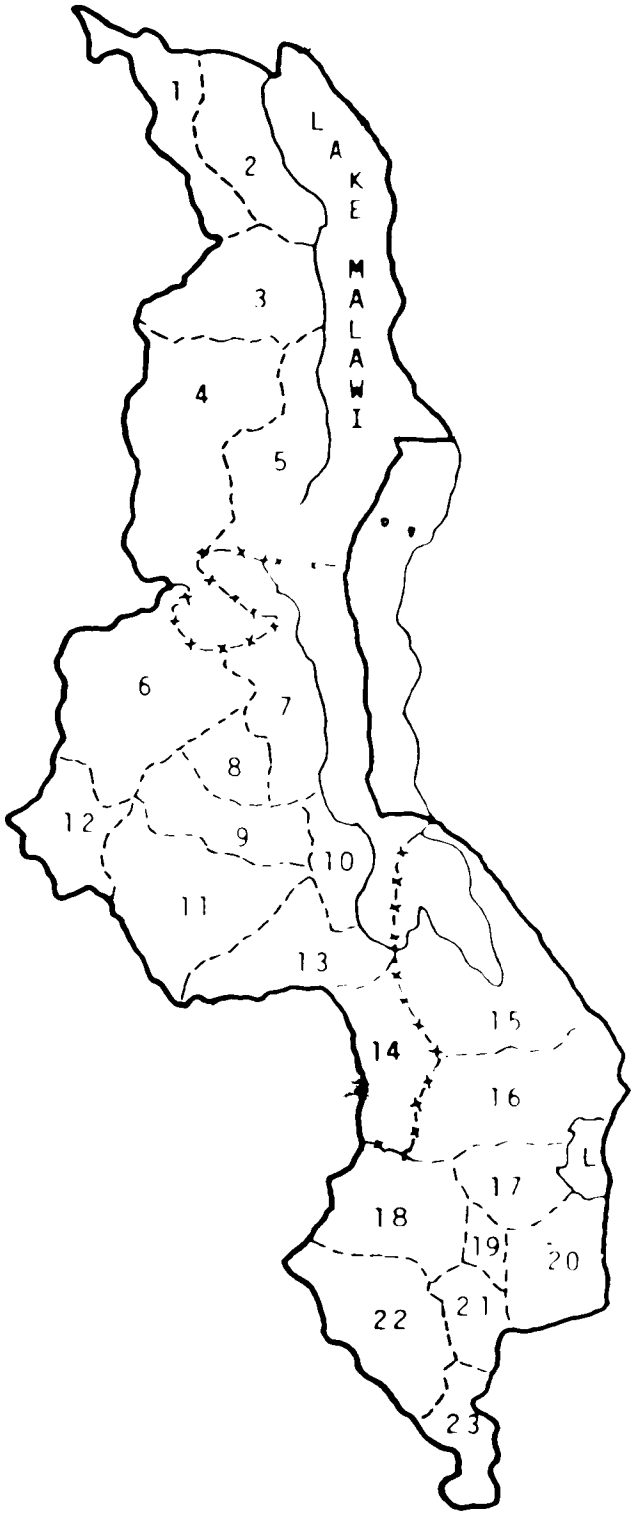
[2] Ibid., p. v.

[3] Ibid., p. iii.

[4] An enumeration area was defined as a small geographical area used in the Malawi 1966 population census as a unit of enumeration.

## MAP 4.1

## ADMINISTRATIVE AREAS




NORTHERN REGION

1. Chitipa
2. Karonga
3. Rumpi
4. Mzimba
5. Nkhata Bay

CENTRAL REGION

6. Kasungu
7. Nkhota Kota
8. Ntchisi
9. Dowa
10. Salima
11. Lilongwe
12. Mchinji
13. Dedza
14. Ncheu

SOUTHERN REGION

15. Mangochi
16. Kasupe
17. Zomba
18. Blantyre
19. Chiradzulu
20. Mulanje
21. Thyolo
22. Chikwawa
23. Nsanje

L CHILWA

The income data used in this study was obtained during a household interview phase of the N.S.S.A. The interviews were conducted during September and November, 1969. The data were obtained by enumerators who interviewed all the sample households for "information for the previous twelve months about farm equipment, farm buildings, livestock, farm expenditures, crop and livestock sales, expenditure on durable consumer goods (including clothing), expenditure on services, and non-farm sources of cash income."[1] The income data are reported in the Malawi pound currency. For the purposes of this study the data have been converted into the new Malawi decimal currency using the conversion rate used when the currency was decimalized in 1971.[2]

## Income Definitions

Various definitions of rural cash incomes will be referred to in the study. They are "gross farm cash income", "net farm cash income", "off-farm cash income" and "cash transfers".

### Gross Farm Cash Income

Gross farm cash income is defined as cash received

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[1] Malawi Government, N.S.S.A. 1968/69, pp. vii-viii.

[2] Currency unit = Malawi Kwacha (K). Conversion rate: One Malawi pound (£1) = K2.00 = 200 t (tambala).

from the sale of crops, livestock, livestock products and wood products. It is equivalent to the 1968/69 N.S.S.A. definition of current farm cash receipts.

Net Farm Cash Income

In this study net farm cash income is equivalent to the definition of current farm cash income used by the 1968/69 N.S.S.A. It is defined as gross farm cash income minus cash payments made for hand tools, fertilizer, insecticide, labour, seeds and farm transport.

Off-Farm Cash Income

Off-farm cash income is defined as cash other than net farm cash income received from wages, salaries and profits. It is equivalent to the definition of other current cash income used in the 1968/69 N.S.S.A. report.

Cash Transfers

Cash transfers is cash received as gifts from abroad and within Malawi, plus lobola (bride price), plus credit received and still owed at the end of the year plus withdrawals from savings plus the cash sale of capital assets and repayments received for cash loans. This definition is equivalent to other cash receipts used in the 1968/69 N.S.S.A. report.

## Estimation of 1968/69 Rural Cash Income Distributions

Estimation of income size distributions was performed in two stages. In the first stage the distributions of households[1] for the districts, the regions and Malawi as a whole were constructed from the respective percentage distributions of households by net farm cash income plus off-farm cash income classes and the total number of households (Table 4.2).

### Distribution of Households

The frequency distribution of households presented in Table 4.2 shows that the distribution of households by income class is extremely skewed. Diagram 4.1, constructed from the percentage distributions in Table 4.2, shows a definite pattern in the national and regional frequency distributions. All four distributions are positively skewed with a very weak middle income group peaking at the K50.01 - K120.00 income level. The Southern Region has the largest proportion of households in the middle income range.

Sampled areas in the four largest project areas (Karonga Rural Development Project, Lilongwe Land Develop-

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[1] A household for the 1968/69 N.S.S.A. was defined as a group of people who usually take all their food from a common pot, i.e., a group of people who eat together. The estimated average household size for 1968/69 for the traditional rural areas of Malawi was 4.6. See Malawi Government, National Sample Survey of Agriculture 1968/69, p. xxi.

TABLE 4.2

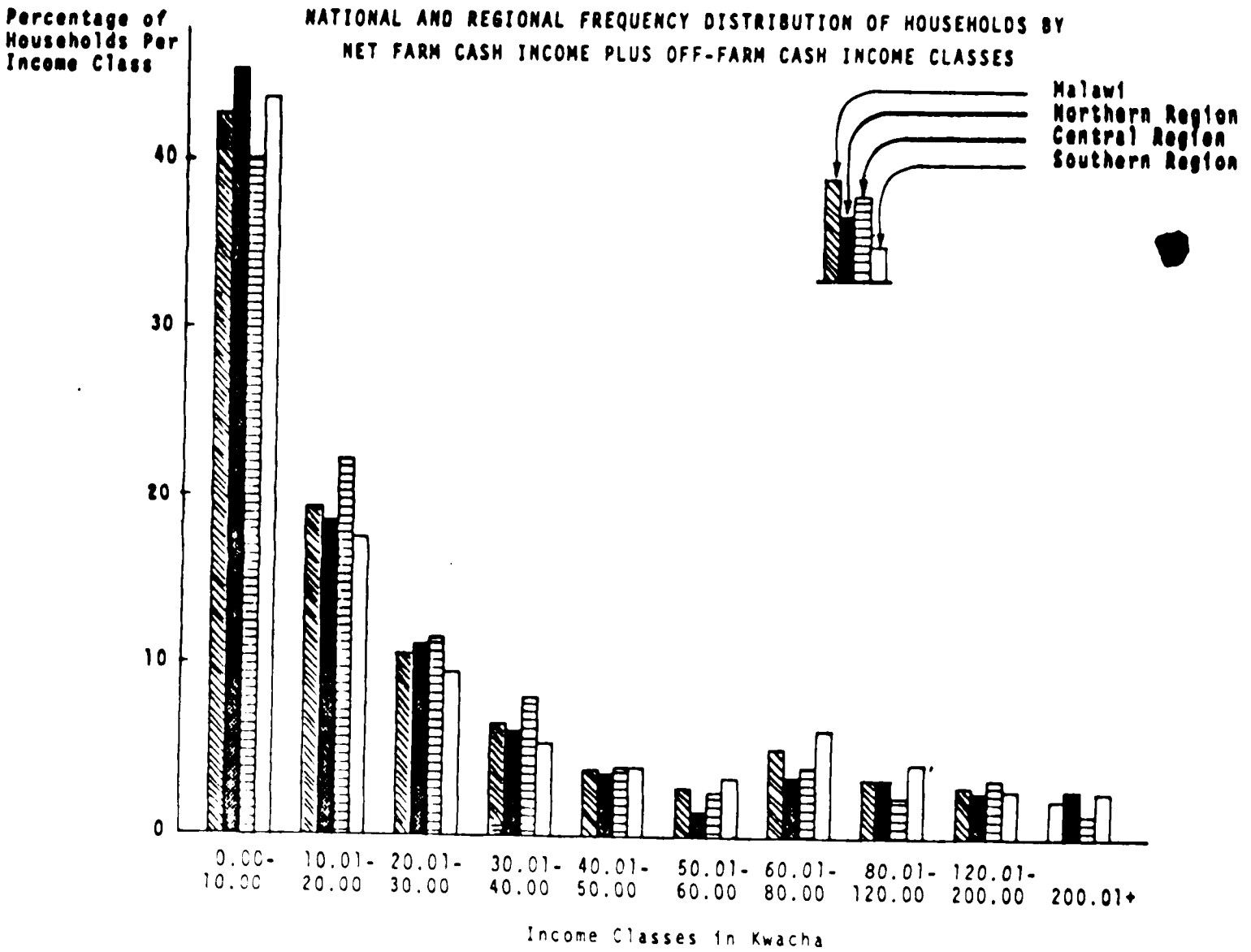
PERCENTAGE OF HOUSEHOLDS BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME GROUPS

| Regional District | Recorded Net Farm Cash Income Plus Off-Farm Cash Income (Kwacha) | | | | | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.00-[a] 10.00 | 10.01- 20.00 | 20.01- 30.00 | 30.01- 40.00 | 40.01- 50.00 | 50.01- 60.00 | 60.01- 80.00 | 80.01- 120.00 | 120.01- 200.00 | 200.01+ | % | No. ('000) |
| Chitipa | 41.9 | 19.8 | 10.7 | 6.0 | 4.2 | 3.0 | 3.6 | 6.0 | 2.1 | 2.7 | 100.00 | 14.4 |
| Karonga | 21.5 | 20.0 | 15.7 | 11.3 | 5.8 | 2.8 | 7.1 | 5.8 | 6.1 | 3.8 | 100.00 | 16.8 |
| Nkhata Bay | 59.5 | 6.8 | 8.1 | 6.8 | 4.0 | 1.4 | 0 | 4.0 | 1.4 | 8.1 | 100.00 | 24.0 |
| Rumpi | 43.2 | 16.5 | 10.9 | 6.4 | 6.4 | 1.9 | 4.6 | 3.9 | 3.9 | 2.3 | 100.00 | 9.3 |
| Mzimba | 47.5 | 23.2 | 11.4 | 5.7 | 2.6 | 0.8 | 4.1 | 1.8 | 2.4 | 0.5 | 100.00 | 52.6 |
| NORTHERN REGION | 45.2 | 18.4 | 11.2 | 6.8 | 3.9 | 1.5 | 3.6 | 3.5 | 2.8 | 2.9 | 100.00 | 117.1 |
| Kasungu | 40.7 | 28.3 | 8.7 | 7.5 | 5.3 | 3.7 | 3.6 | 1.5 | 0.7 | 0 | 100.00 | 25.5 |
| Nkhota Kota | 46.3 | 13.9 | 17.0 | 7.0 | 5.2 | 5.4 | 2.1 | 1.4 | 1.1 | 0.5 | 100.00 | 14.4 |
| Ntchisi | 48.4 | 18.4 | 9.9 | 6.6 | 3.3 | 2.6 | 4.2 | 3.0 | 2.8 | 0.9 | 100.00 | 15.9 |
| Dowa | 29.0 | 22.0 | 13.0 | 9.7 | 4.9 | 3.5 | 6.0 | 7.0 | 2.9 | 2.1 | 100.00 | 40.7 |
| Salima | 48.9 | 15.9 | 11.8 | 8.8 | 4.1 | 2.3 | 4.5 | 0.7 | 2.8 | 0.2 | 100.00 | 18.0 |
| Lilongwe | 29.6 | 25.9 | 15.1 | 12.7 | 4.0 | 1.7 | 4.4 | 1.3 | 5.9 | 1.4 | 100.00 | 93.2 |
| Mchinji | 35.6 | 16.7 | 7.7 | 6.3 | 6.2 | 5.7 | 4.5 | 5.9 | 7.6 | 4.0 | 100.00 | 17.4 |
| Dedza | 50.5 | 25.4 | 10.2 | 3.0 | 2.6 | 1.7 | 3.0 | 0.8 | 2.1 | 0.6 | 100.00 | 54.0 |
| Ncheu | 53.8 | 19.1 | 6.4 | 4.4 | 3.7 | 2.3 | 4.5 | 1.2 | 2.0 | 2.6 | 100.00 | 37.8 |
| CENTRAL REGION | 40.0 | 22.1 | 11.7 | 8.1 | 4.1 | 2.6 | 4.2 | 2.3 | 3.5 | 1.4 | 100.00 | 316.9 |
| Mangoche | 61.4 | 13.0 | 7.3 | 5.6 | 4.6 | 1.6 | 2.0 | 4.2 | 0.3 | 0 | 100.00 | 52.3 |
| Kasupe | 42.6 | 22.5 | 15.4 | 2.5 | 2.8 | 3.0 | 5.2 | 1.5 | 1.2 | 3.3 | 100.00 | 53.5 |
| Zomba | 49.7 | 15.8 | 6.8 | 8.1 | 2.1 | 2.6 | 6.1 | 4.0 | 1.5 | 3.3 | 100.00 | 50.1 |
| Chiradzulu | 36.2 | 17.3 | 8.6 | 9.2 | 12.1 | 1.9 | 5.6 | 2.5 | 4.3 | 2.3 | 100.00 | 33.6 |
| Blantyre | 30.9 | 21.4 | 10.5 | 3.6 | 6.1 | 3.1 | 8.1 | 4.5 | 5.0 | 7.0 | 100.00 | 44.9 |
| Thyolo | 43.1 | 17.4 | 8.8 | 4.0 | 4.8 | 3.7 | 4.8 | 5.5 | 5.8 | 2.0 | 100.00 | 55.6 |
| [illegible]ulanje | 45.7 | 15.5 | 7.6 | 5.3 | 1.4 | 5.6 | 9.7 | 6.0 | 1.8 | 1.4 | 100.00 | 102.8 |
| [illegible]kwawa | 29.2 | 22.1 | 12.4 | 6.8 | 4.6 | 5.3 | 3.3 | 5.5 | 5.7 | 5.2 | 100.00 | 33.3 |
| [illegible]anje | 43.5 | 16.0 | 13.4 | 5.4 | 3.9 | 1.6 | 7.3 | 2.6 | 2.6 | 3.9 | 100.00 | 24.9 |
| [illegible]THERN REGION | 43.7 | 17.5 | 9.6 | 5.4 | 4.1 | 3.5 | 6.2 | 4.4 | 2.9 | 2.8 | 100.00 | 451.0 |
| [illegible]LL MALAWI | 42.6 | 19.3 | 10.6 | 6.6 | 4.0 | 2.9 | 5.2 | 3.5 | 3.1 | 2.3 | 100.00 | 885.[illegible] |

[a] The K0.00-K10.00 group is a combination of the lowest two groups of the original data.

SOURCE: Malawi Government, National Sample Survey of Agriculture 1968/69, Table D6.10, p. 105.

DIAGRAM 4.1


NATIONAL AND REGIONAL FREQUENCY DISTRIBUTION OF HOUSEHOLDS BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME CLASSES
Percentage of Households Per Income Class
Malawi
Northern Region
Central Region
Southern Region
40
30
20
10
0
0.00-10.00
10.01-20.00
20.01-30.00
30.01-40.00
40.01-50.00
50.01-60.00
60.01-80.00
80.01-120.00
120.01-200.00
200.01+
Income Classes in Kwacha

ment Program, Central Region Lakeshore Development Project - Salima, and the Lower Shire Cotton Development Project - Chikwawa) show that these project areas, with the exception of Salima, had fewer households in the lowest income group (Diagram 4.2) than the regional frequency distributions of households (Diagram 4.1). Lilongwe Land Development Program, the biggest single rural development program in Malawi, had the smallest proportion of households in the lowest income group (17.8 percent) as well as the biggest proportion of households in the income range K20.01 - K60.00 (Diagram 4.2).

Distribution of Income Per Household

The second stage of the estimation of income size distributions involved computation of the income size distributions using the household distributions worked out in stage one and the average cash incomes per household by net farm cash income plus off-farm cash income classes (Table 4.3). Distribution of cash incomes for districts and natural areas were computed using the regional cash incomes per household because similar data on district and natural area levels were not available. All the distributions are based on the distribution of households according to net farm cash income plus off-farm cash income classes.

The highest average gross farm cash income per household and the highest net farm cash income per household was in the Southern Region at K17.08 and K14.36, respectively. The Central Region had the highest average net farm cash

DIAGRAM 4.2

PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME CLASSES IN THE FOUR MAJOR RURAL DEVELOPMENT PROJECT AREAS

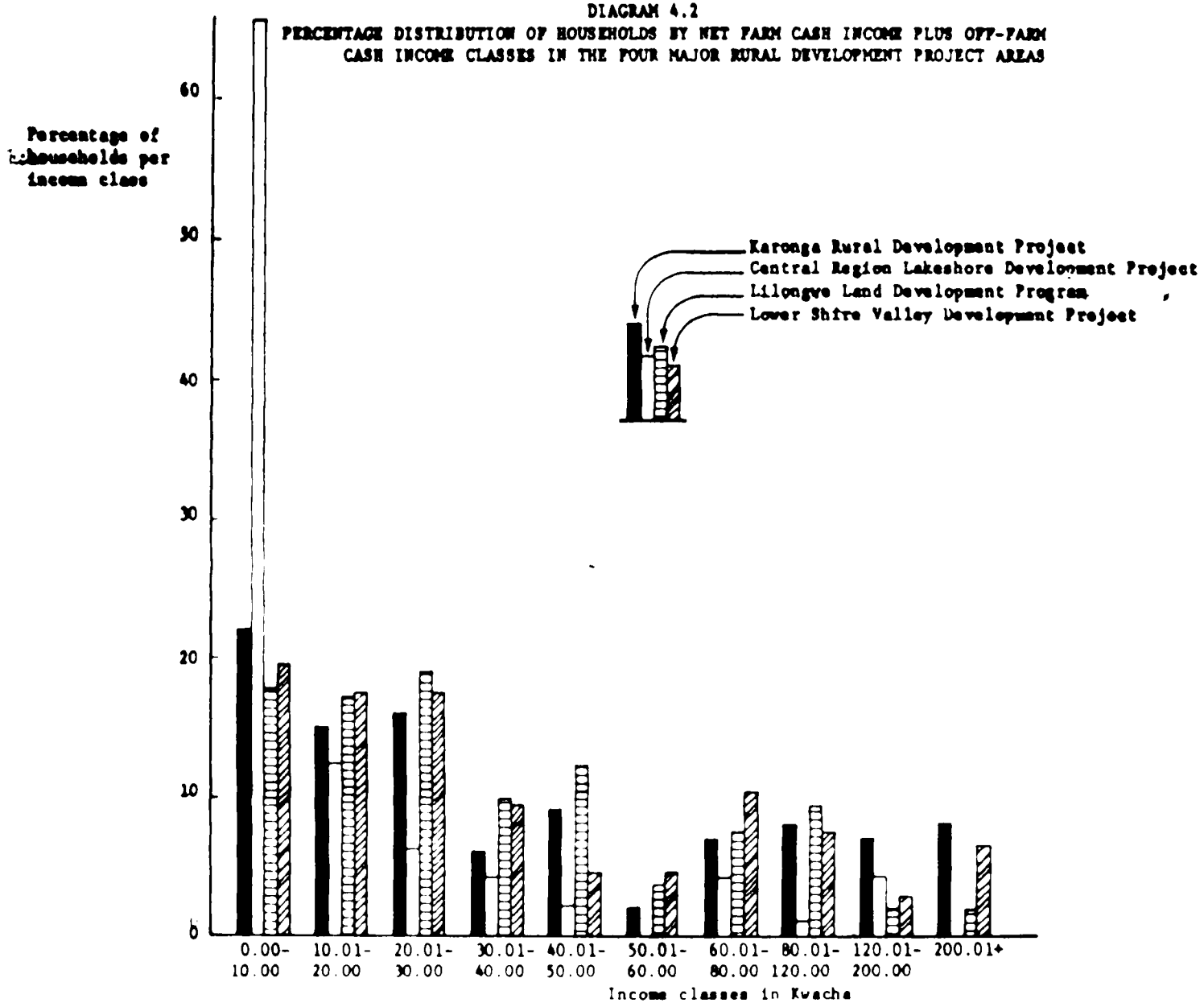


TABLE 4.3.1

AVERAGE RECORDED CASH INCOMES PER HOUSEHOLD BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME GROUPS - MALAWI (KWACHA)

| Economic Class | Gross Farm Cash Income (G) | Net Farm Cash Income (N) | Net Farm Cash Income Plus Off-Farm Cash Income ($N_w$) | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers ($N_t$) |
|---|---|---|---|---|
| 0 - 10.00 | 2.46[a] | 1.40[a] | 3.55[a] | 9.62[a] |
| 10.01 - 20.00 | 8.70 | 7.05 | 15.60 | 21.53 |
| 20.01 - 30.00 | 14.67 | 12.12 | 25.48 | 30.52 |
| 30.01 - 40.00 | 20.16 | 17.04 | 36.87 | 43.12 |
| 40.01 - 50.00 | 20.04 | 15.99 | 44.98 | 48.94 |
| 50.01 - 60.00 | 25.10 | 19.04 | 53.80 | 69.97 |
| 60.01 - 80.00 | 27.69 | 20.82 | 69.56 | 73.41 |
| 80.01 - 120.00 | 37.04 | 27.21 | 98.98 | 104.17 |
| 120.01 - 200.00 | 53.50 | 40.76 | 152.59 | 161.75 |
| 200.00+ | 48.86 | 22.03 | 384.62 | 395.77 |
| All Households | 12.63 | 9.34 | 33.64 | 39.87 |

[a] Weighed average of the original two lowest income groups.

SOURCE: Malawi Government, National Sample Survey of Agriculture 1968/69, Table R6.13, pp. 29-40.

TABLE 4.3.2

AVERAGE RECORDED CASH INCOMES PER HOUSEHOLD BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME GROUPS - NORTHERN REGION (KWACHA)

| Economic Class | Gross Farm Cash Income (G) | Net Farm Cash Income (N) | Net Farm Cash Income Plus Off-Farm Cash Income ($N_w$) | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers ($N_t$) |
|---|---|---|---|---|
| 0 - 10.00 | 2.40[a] | 1.63[a] | 3.17[a] | 12.31[a] |
| 10.01 - 20.00 | 9.17 | 7.81 | 14.52 | 22.81 |
| 20.01 - 30.00 | 22.51 | 20.59 | 29.94 | 41.42 |
| 30.01 - 40.00 | 21.46 | 19.34 | 34.46 | 42.33 |
| 40.01 - 50.00 | 26.47 | 23.23 | 46.2[illegible] | 51.83 |
| 50.01 - 60.00 | 32.02 | 29.59 | 54.[illegible] | 62.48 |
| 60.01 - 80.0 | 34.0[illegible] | 29.26 | 71.38 | 75.48 |
| 80.01 - 120.00 | 39.39 | 30.90 | 95.95 | 99.96 |
| 120.01 - 200.00 | 53.13 | 42.93 | 147.01 | 153.97 |
| 200.01+ | 26.19 | 16.37 | 403.28 | 417.22 |
| All Households | 13.16 | 11.01 | 34.33 | 43.04 |

[a] Weighed average of the original two lowest income groups.

SOURCE: Malawi Government, National Sample Survey of Agriculture 1968/69, Table R6.13, pp. 29-40.

TABLE 4.3.3

AVERAGE RECORDED CASH INCOMES PER HOUSEHOLD BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME GROUPS - CENTRAL REGION (KWACHA)

| Economic Class | Gross Farm Cash Income (G) | Net Farm Cash Income (N) | Net Farm Cash Income Plus Off-Farm Cash Income ($N_w$) | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers ($N_t$) |
|---|---|---|---|---|
| 0 - 10.00 | 2.86[a] | 2.24[a] | 4.13[a] | 8.48[a] |
| 10.01 - 20.00 | 9.71 | 7.99 | 16.62 | 21.64 |
| 20.01 - 30.00 | 15.42 | 13.58 | 24.48 | 27.8[illegible] |
| 30.01 - 40.00 | 24.67 | 21.43 | 35.12 | 42.74 |
| 40.01 - 50.00 | 28.00 | 23.70 | 44.64 | 49.33 |
| 50.01 - 60.00 | 38.30 | 31.27 | 52.95 | 66.77 |
| 60.01 - 80.00 | 53.73 | 46.90 | 69.45 | 74.47 |
| 80.01 - 120.00 | 61.08 | 52.28 | 103.24 | 110.07 |
| 120.01 - 200.00 | 74.01 | 60.20 | 158.82 | 176.20 |
| 200.01+ | 113.25 | 91.46 | 424.50 | 433.78 |
| All Households | [illegible] | 14.36 | 31.04 | 36.[illegible] |

[a] weighted average of the original two lowest income groups.

SOURCE: Malawi Government, National Sample Survey of Agriculture 1968/69, Table R6.13, [illegible]-4.

TABLE 4.3.4

AVERAGE RECORDED CASH INCOME PER HOUSEHOLD BY NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME GROUPS - SOUTHERN REGION (KWACHA)

| Economic Class | Gross Farm Cash Income $G_i$ | Net Farm Cash Income $N_i$ | Net Farm Cash Income Plus Off-Farm Cash Income $N_w$ | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers $N_t$ |
|---|---|---|---|---|
| 0 - 10.00 | 2.20[a] | [illegible][a] | [illegible][a] | [illegible][a] |
| 10.01 - 20.00 | [illegible] | [illegible] | [illegible] | [illegible] |
| 20.01 - 30.00 | [illegible] | [illegible] | 24.98 | 29.52 |
| 30.01 - 40.00 | [illegible] | [illegible] | 39.50 | 43.78 |
| 40.01 - 50.00 | [illegible] | [illegible] | 44.[illegible] | [illegible] |
| 50.01 - 60.00 | [illegible] | [illegible] | [illegible] | [illegible] |
| 60.01 - [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 120.01 - 200.00 | 35.78 | [illegible] | [illegible] | [illegible] |
| 200.01+ | [illegible] | [illegible] | [illegible] | [illegible] |
| All households | [illegible] | [illegible] | [illegible] | [illegible] |

[a] Weighted average of the original two lowest income groups

Source: Malawi Government, National Sample Survey of Agriculture 1968-69, Vol. II, p. 9.

income plus off-farm cash income per household at K35.29 while the Northern Region had the highest average household net farm cash income plus off-farm cash income plus cash transfers at K43.04 (Table 4.3).

The distributions of income according to the various definitions of income for Malawi as a whole, for the regions, the districts and the selected natural areas are presented in Appendix B.

## Reliability of the Data

Survey data pose a number of problems which are conventionally classified into sampling errors and non sampling errors. The 1968/69 N.S.S.A. report lists the following categories of non-sampling errors[1]

(a) Inaccuracies in the sample weights resulting from incorrect assumptions about the universe

(b) Weaknesses in the methods used to collect the data

(c) Inaccuracies in the replies of the respondents

(d) Bias resulting from non response

(e) Errors made by the enumerators when recording information

(f) Errors made when coding or punching the information for processing.

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[1] Ibid., p. xv.

(g) Errors made when processing the punch cards.

(h) Errors in the printing and publishing of the data.

Non-sampling errors from categories (e), (f), (g), and (h) "are thought to have been greatly reduced by the supervision in the field, the quality control of the edit and coding, the 100 percent verification of the punching and the systematic checking of the returns from the computer and the final work sheets."[1] The extent of inaccuracies resulting from the other non-sampling error categories, (a), (b), (c), and (d), were gauged using other independent sources of information.

The most serious discrepancy noted between the different definitions of rural cash incomes data contained in the 1968/69 N.S.S.A. report and other independent sources of information is an underestimation of gross farm cash income by 37 percent compared to the National Accounts estimate.[2] This underestimation is thought to have resulted from crops being sold in small quantities throughout the year and respondents not being able to remember all their sales. Other discrepancies between the 1968/69 N.S.S.A. data used in this study and other independent sources of information are minor and no clear trend of over- or underestimation is apparent. However, as a result of the noted underestimation

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[1] Ibid.

[2] Ibid., p. xxiii.

of gross farm cash income, it is estimated that the 1968/69 N.S.S.A. underestimated net farm cash income by 44 percent, net farm cash income plus off-farm cash income by 18 percent, and net farm cash income plus off-farm cash income plus cash transfers by 16 percent.[1] No attempt has been made in this study to correct for these underestimations because the 1968/69 N.S.S.A. report does not specify how much underestimation occurs in each of the economic classes used for the income distributions.

The 1968/69 N.S.S.A. report gives the coefficients of variation for some of the data as an indication of sampling errors. Unfortunately, the report does not give the coefficients of variation for the average recorded cash receipts per household data on which the income distributions presented in Appendix B were based.

One of the two major limitations of the data for purposes of measuring income distribution is the use of the frequency distribution of households according to one definition of income (net farm cash income plus off-farm cash income) in the construction of all the distributions of the different definitions of income presented in Appendix B. Each definition of income has a particular distribution of households by income groups which may shift the distribution of households by net farm cash income plus off-farm cash income groups. However, the 1968/69 N.S.S.A. data do

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[1] Ibid., p. xxv.

not allow one to reorder the distribution of households according to each definition of income.

The second major limitation of the data is the absence of data on the distribution of non-monetary incomes.[1] A substantial part of rural incomes in Malawi is in non-monetary form (Table 1.2) and the inclusion of such incomes may alter the level and distribution of incomes and give a more accurate picture of the income inequality problem in the rural areas of Malawi. This author's guess is that inclusion of non-monetary income would improve the level and distribution of rural incomes in Malawi.

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[1] The 1968/69 N.S.S.A. report contains data on the average volumes of various foods consumed by a household for the whole country, the 3 regions and the 23 districts. However, the data are insufficient for purposes of estimating the distribution of income in kind.

# CHAPTER V

# INCOME DISTRIBUTION IN MALAWI, 1968/69

## Measures Used in This Study

Five summary measures of inequality were computed for each district, each region, Malawi as a whole, and each of the four major project areas.[1] The measures computed include the standard deviation of logarithms, Atkinson's measure of inequality, the Gini coefficient, the variance and the coefficient of variation. The results are presented in Tables 5.1 and 5.8.

The standard deviation of logarithms and Atkinson's measure of inequality have a theoretical appeal for measuring income distribution inequality when the bulk of the households fall in the low income group as is the case in Malawi. This study makes use of the standard deviation of logarithms for the purpose of measuring income distribution in Malawi. However, complete rankings of income distribution inequality by the standard deviation of logarithms are not possible for some cases when net farm income is con-

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[1] The standard deviation of logarithms and the Gini coefficient were not calculated for distributions which had negative total income accruing to any one single group of the distribution.

TABLE 5.1.1

SUMMARY MEASURES OF THE 1968/69 DISTRIBUTION OF RURAL CASH INCOME BY DEFINITION OF INCOME AND BY DISTRICT, REGION AND MALAWI AS A WHOLE
(GROSS FARM CASH INCOME)

| District/Region | Standard Deviation of Logarithms | Atkinson Measure of Inequality $\varepsilon$ = | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | .5378 | .7374 | .4933 | 177.3 | 0.9502 |
| Karonga | .5775 | .8465 | .3971 | 210.6 | 0.7431 |
| Nkhata Bay | .5903 | .7465 | .5359 | 155.9 | 1.1203 |
| Rumpi | .5496 | .7455 | .4988 | 195.4 | .9650 |
| Mzimba | .5080 | .6945 | .5151 | 146.0 | 1.0462 |
| NORTHERN REGION | .5421 | .7335 | .5057 | 171.8 | .9973 |
| Kasungu | .4509 | .6398 | .5009 | 208.3 | 1.0663 |
| Nkhota Kota | .8165 | .8805 | .7153 | 7255.3 | 2.6219 |
| Ntchisi | .5708 | .7449 | .5911 | 413.7 | 1.3232 |
| Dowa | .5458 | .7642 | .5344 | 576.1 | 1.0861 |
| Salima | .5845 | .7596 | .5813 | 308.1 | 1.2662 |
| Lilongwe | .5096 | .7278 | .5283 | 490.2 | 1.1315 |
| Mchinji | .6443 | .8244 | .5747 | 839.6 | 1.1418 |
| Dedza | .5009 | .6784 | .5650 | 282.6 | 1.4110 |

TABLE 5.1.1 (CONTINUED)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Ncheu | 1.1860 | .9639 | .7307 | 555.2 | 1.7308 |
| CENTRAL REGION | .5501 | .7430 | .5683 | 458.3 | 1.2539 |
| Mangochi | .4410 | .5989 | .4896 | 45.0 | 1.0557 |
| Kasupe | .4065 | .5922 | .4364 | 56.9 | .8966 |
| Zomba | .4584 | .6401 | .4851 | 72.9 | .9895 |
| Chiradzulu | .4222 | .6297 | .4239 | 75.5 | .8502 |
| Blantyre | .4480 | .6724 | .4437 | 103.3 | .8576 |
| Thyolo | .4844 | .6822 | .4928 | 98.0 | .9811 |
| Mulanje | .4639 | .6565 | .4699 | 72.5 | .9299 |
| Chikwawa | .4346 | .6600 | .4347 | 101.2 | .8346 |
| Nsanje | .4359 | .6275 | .4567 | 74.1 | .9377 |
| SOUTHERN REGION | .4575 | .6527 | .4717 | 78.8 | .9486 |
| ALL MALAWI | .5116 | .7094 | .5165 | 172.4 | 1.0383 |

TABLE 5.1.2

SUMMARY MEASURES OF THE 1968/69 DISTRIBUTION OF RURAL CASH INCOME BY DEFINITION OF INCOME AND BY DISTRICT, REGION AND MALAWI AS A WHOLE

(NET FARM CASH INCOME)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | .5892 | .7825 | .4958 | 126.7 | .9586 |
| Karonga | .4979 | .7765 | .3684 | 139.0 | .7062 |
| Nkhata Bay | 1.2230 | .9600 | .7246 | 30898.5 | 4.0168 |
| Rumpi | .5996 | .7876 | .5011 | 139.5 | .9696 |
| Mzimba | .5620 | .7457 | .5308 | 108.2 | 1.0612 |
| NORTHERN REGION | .5993 | .7821 | .5118 | 123.3 | 1.0098 |
| Kasungu | .4614 | .6518 | .5077 | 152.2 | 1.0784 |
| Nkhota Kota | .5613 | .7483 | .5515 | 189.2 | 1.1821 |
| Ntchisi | .5962 | .7657 | .5994 | 293.7 | 1.3275 |
| Dowa | .5596 | .7776 | .5360 | 407.4 | 1.0795 |
| Salima | .6442 | .8036 | .5989 | 221.9 | 1.2862 |
| Lilongwe | .5177 | .7368 | .5279 | 338.6 | 1.1152 |
| Mchinji | .6670 | .8399 | .5760 | 580.2 | 1.1371 |
| Dedza | .5250 | .7025 | .5772 | 200.0 | 1.4213 |

TABLE 5.1.2 (CONTINUED)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Ncheu | .6120 | .7660 | .6340 | 365.8 | 1.5329 |
| CENTRAL REGION | .5688 | .7600 | .5731 | 321.6 | 1.2489 |
| Mangochi | .9463 | .9130 | .6378 | 24.3 | 1.3271 |
| Kasupe | -- | .6531 | -- | 19.0 | 0.0911 |
| Zomba | -- | .7415 | -- | 27.0 | 1.0855 |
| Chiradzulu | -- | .6799 | -- | 30.4 | 0.8679 |
| Blantyre | -- | .7365 | -- | 35.9 | 0.9768 |
| Thyolo | -- | .8339 | -- | 41.2 | 1.0735 |
| Mulanje | -- | .8082 | -- | 30.2 | 1.0234 |
| Chikwawa | -- | .7068 | -- | 37.9 | .8914 |
| Nsanje | -- | .6802 | -- | 26.3 | .9853 |
| SOUTHERN REGION | -- | .7805 | -- | 31.1 | 1.0322 |
| ALL MALAWI | .5771 | .7735 | .5154 | 89.4 | 1.0106 |

TABLE 5.1.3

SUMMARY MEASURES OF THE 1968/69 DISTRIBUTION OF RURAL CASH INCOME BY DEFINITION OF INCOME AND BY DISTRICT, REGION AND MALAWI AS A WHOLE (NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | .7318 | .8603 | .6779 | 4721.8 | 1.9416 |
| Karonga | .6469 | .8607 | .6028 | 6282.2 | 1.5415 |
| Nkhata Bay | 1.0172 | .9281 | .7898 | 11776.1 | 2.2382 |
| Rumpi | .7150 | .8507 | .6674 | 4301.2 | 1.8788 |
| Mzimba | .6137 | .7834 | .6216 | 1518.0 | 1.7564 |
| NORTHERN REGION | .7524 | .8640 | .6988 | 5029.7 | 2.0697 |
| Kasungu | .4565 | .6537 | .4935 | 515.3 | 1.0859 |
| Nkhota Kota | .5682 | .7571 | .5719 | 1405.1 | 1.6539 |
| Ntchisi | .8606 | .8937 | .7309 | 20415.0 | 2.6927 |
| Dowa | .6019 | .8100 | .6015 | 4373.3 | 1.6368 |
| Salima | .6364 | .8094 | .6097 | 1232.9 | 1.5708 |
| Lilongwe | .5645 | .7781 | .5915 | 3522.7 | 1.6550 |
| Mchinji | .7177 | .8648 | .6346 | 4489.3 | 1.4233 |
| Dedza | .5538 | .7328 | .6096 | 1691.9 | 1.9907 |

TABLE 5.1.3 (CONTINUED)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality ε = 3 | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Ncheu | .6909 | .8184 | .7082 | 4933.5 | 2.3486 |
| CENTRAL REGION | .6114 | .7[illegible] | .6282 | 3282.9 | 1.8461 |
| Mangochi | .6929 | .8[illegible] | .6505 | 604.1 | 1.5017 |
| Kasupe | .6667 | .8217 | .6772 | 4405.8 | 2.0997 |
| Zomba | .7574 | .9589 | .7027 | 4607.3 | 2.0114 |
| Chiradzulu | .6490 | .[illegible]75 | .6[illegible]76 | 3675.0 | 1.6204 |
| Blantyre | .7683 | .[illegible]903 | .6751 | 8542.4 | 1.6600 |
| Thyolo | .64[illegible]8 | .8427 | .6096 | 3028.0 | 1.8924 |
| Mulanje | .7321 | .8566 | .6437 | 2661.4 | 1.6223 |
| Chikwawa | .7042 | .8640 | .6556 | 6842.7 | 1.6462 |
| Nsanje | .7[illegible] | .8[illegible] | .6870 | 5279.2 | 1.9039 |
| SOUTHERN REGION | .74[illegible] | .8624 | .67[illegible] | 42[illegible]4.8 | 1.[illegible] |
| ALL MALAWI | .[illegible] | .8473 | .6652 | 39[illegible].8 | 1.[illegible] |

TABLE 5.1.4

SUMMARY MEASURES OF THE 1968/69 DISTRIBUTION OF RURAL CASH INCOME BY DEFINITION OF INCOME AND BY DISTRICT, REGION AND MALAWI AS A WHOLE (NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME PLUS CASH TRANSFERS)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality ε = 3 | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | .4313 | .6014 | .5376 | 4762.4 | 1.5711 |
| Karonga | .4277 | .6243 | .5116 | 6358.0 | 1.3350 |
| Nkhata Bay | .5934 | .7358 | .6623 | 12016.6 | 1.8953 |
| Rumpi | .4309 | .6016 | .5317 | 4362.1 | 1.5072 |
| Mzimba | .3355 | .4641 | .4379 | 1494.7 | 1.2537 |
| NORTHERN REGION | .43[illegible] | .6[illegible] | .5503 | 5075.5 | 1.6590 |
| Kasungu | [illegible] | .5[illegible] | .4256 | 589.0 | .9362 |
| Nkhota Kota | .40[illegible] | [illegible] | .4873 | [illegible] | [illegible] |
| Ntchisi | .4646 | .6397 | .5567 | 2[illegible].6 | [illegible] |
| Dowa | 4[illegible] | .6[illegible] | 5492 | 4[illegible] | [illegible] |
| Salima | 4[illegible] | [illegible] | .5[illegible]63 | [illegible] | [illegible] |
| Lilongwe | 4[illegible] | [illegible] | .5[illegible] | [illegible] | [illegible] |
| Mchinji | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Dedza | .4[illegible] | [illegible] | .5[illegible] | [illegible] | [illegible] |

TABLE 5.1.4 (CONTINUED)

| District/Region | Standard Deviation of Logarithms | Atkinson's Measure of Inequality | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Ncheu | .5149 | [illegible] | .6236 | 5331.4 | 2.0598 |
| CENTRAL REGION | .4689 | [illegible] | .5588 | 3595.8 | 1.6341 |
| Mangochi | .3508 | 4[illegible] | .4426 | 569.5 | 1.0399 |
| Kasupe | .4624 | 6374 | .5734 | 4444.9 | 1.7830 |
| Zomba | .5015 | [illegible] | .5942 | 4621.8 | 1.7143 |
| Chiradzulu | .4627 | .6551 | .5378 | 3673.4 | 1.4249 |
| Blantyre | .5590 | [illegible] | .6700 | 8503.0 | 1.5096 |
| Thyolo | 4[illegible] | [illegible] | .6662 | 3[illegible].6 | 1.43[illegible] |
| Mulanje | 4454 | [illegible] | 5.4[illegible] | [illegible] | [illegible] |
| Chikwawa | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Nsanje | [illegible] | [illegible] | .3964 | [illegible] | [illegible] |
| SOUTHERN REGION | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

sidered. Under such circumstances, rankings [illegible] distribution inequality according to Atkinson [illegible] of inequality are used as the next best [illegible] ings using an arbitrary value of [illegible] emphasized that these are synthetic [illegible] a single figure to measure income distribution [illegible] misses some aspects of income distribution [illegible].

For purposes of ranking and comparing the [illegible] income distributions, emphasis is placed on the [illegible] values of the standard deviation of [illegible], and Atkinson's measure of inequality, rather than on the absolute values, since no meaningful statistical [illegible] significance exists by which differences between the absolute values of these measures can be [illegible] of a significance test on the difference [illegible] sures, an analysis of variance [illegible] distribution [illegible] conducted [illegible] determine whether the [illegible] were significantly different.

Analysis of variance provides a basis for [illegible] any number of series simultaneously. The results of analysis of variance for the regional distributions are presented in Table [illegible]. The F ratio [illegible] the conclusion, with 99.99 percent confidence, that both the regional and distribution [illegible] different means and variances, i.e., the distributions are significantly different.

TABLE 5.2.1

ANALYSIS OF VARIANCE OF THE DISTRIBUTION OF INCOME BY DEFINITION OF INCOME (REGIONAL DISTRIBUTIONS)

| inition Income | Source of Variation | Variation of Sum of Squared Deviations | Degrees of Freedom | Variance | F-ratio[a] |
|---|---|---|---|---|---|
| ss Farm h Income | Within regional distributions | 200,904,390 | 885,216 | 226 | 24,628 |
| | Between regional distributions | 11,132,205 | 2 | 5,566,102 | |
| Farm h Income | Within regional distributions | 130,341,441 | 885,216 | 147 | 52,238 |
| | Between regional distributions | 15,357,857 | 2 | 7,678,929 | |
| Farm h Income s Off-Farm h Income | Within regional distributions | 3,529,774,395 | 885,216 | 3,987 | 429 |
| | Between regional distributions | 3,425,125 | 2 | 1,712,562 | |
| Farm Cash ome Plus Off- m Cash Income s Cash Transfers | Within regional distributions | 3,635,792,947 | 885,216 | 4,107 | 634 |
| | Between regional distributions | 5,206,978 | 2 | 2,603,489 | |

-ratio = $\frac{\text{Between Regional Distributions Variance}}{\text{Within Regional Distributions Variance}}$

TABLE 5.2.2

ANALYSIS OF VARIANCE OF THE DISTRIBUTION OF INCOME BY DEFINITION OF INCOME (DISTRICT DISTRIBUTIONS)

| finition Income | Source of Variation | Variation of Sum of Squared Deviations | Degrees of Freedom | Variance | F-ratio[a] |
|---|---|---|---|---|---|
| ss Farm h Income | Within district distributions | 890,134,369 | 885,139 | 1,005 | 501 |
| | Between district distributions | 11,097,926 | 22 | 504,451 | |
| Farm h Income | Within district distributions | 865,258,738 | 885,139 | 977 | 715 |
| | Between district distributions | 15,383,098 | 22 | 699,231 | |
| Farm h Income s off-Farm h Income | Within district distributions | 3,626,667,744 | 885,139 | 4,097 | 37 |
| | Between district distributions | 3,424,001 | 22 | 155,636 | |
| Farm Cash ome Plus Off- m Cash Income s Cash Transfers | Within district distributions | 3,519,496,438 | 885,139 | 3,976 | 59 |
| | Between district distributions | 5,208,776 | 22 | 236,762 | |

-ratio = $\frac{\text{Between District Distributions Variance}}{\text{Within District Distributions Variance}}$

## National Income Distribution Inequality, 1968/69

The cumulative percentage income and household data presented in Table B.2 in Appendix B gives the Lorenz curve description of the 1968/69 rural cash income distribution in Malawi. Comparing the lowest and highest income groups one finds that 42.56 percent of the households were in the lowest income group (K0.00 - K10.00) and accounted for only 8.26 percent of total gross farm cash income, 6.36 percent of net farm cash income, 4.49 percent of total net farm cash income plus off-farm cash income, and 10.27 percent of total net farm cash income plus off-farm cash income plus cash transfers. On the other hand, only 2.3 percent of the households were in the highest income bracket (K200.01 and over) but they accounted for 8.8 percent of gross farm cash income, 5.41 percent of net farm cash income, 26.27 percent of net farm cash income plus off-farm cash income, and 22.81 percent of net farm cash income plus off-farm cash income plus cash transfers.

Using the standard deviation of logarithms as an overall measure of income distribution inequality, the results indicate that net farm cash income plus off-farm cash income was the most unequally distributed rural cash income while net farm cash income plus off-farm cash income plus cash transfers was the least unequally distributed rural cash income in 1968/69 (Table 5.3).

TABLE 5.3

RANKING OF THE 1968/69 RURAL CASH INCOME DISTRIBUTIONS IN MALAWI BY STANDARD DEVIATION OF LOGARITHMS

| Definition of Income | Standard Deviation of Logarithms | Ranking of Income Distribution from the Least Unequal to the Most Unequal Distribution |
|---|---|---|
| Gross Farm Cash Income | .5116 | 2 |
| Net Farm Cash Income | .5771 | 3 |
| Net Farm Cash Income Plus Off-Farm Cash Income | .6952 | 4 |
| Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers | .4730 | 1 |

The difference between the inequality in the distributions of net farm cash income plus off-farm cash income and net farm cash income plus off-farm cash income plus cash transfers can be partly explained by the disparity in labour endowment between households. Households with their most healthy male labour working in urban centers, on estates and in neighbouring countries are limited in their capability to grow cash crops and/or take up off-farm employment within the rural areas. As a result the absent male labour force causes considerable inequality in cash incomes generated within the rural areas when all households are considered together. However, most people employed outside the rural area send money to members of their household in the rural area thereby compensating for the disparity in rural cash incomes which arises from labour endowment. The available data do not allow a test of the above hypothesis and it is beyond the scope of this study to identify and explain the economic factors causing the shifts in the distributions of the various definitions of rural cash income.

A comparison of income distribution inequality in Malawi with income distribution inequality in other developing countries was made in an attempt to find if the 1968/69 level of income distribution inequality in Malawi was consistent with that in the other developing countries. The Gini coefficient has been widely used in international comparisons of income inequality. Using net farm cash income

plus off-farm cash income plus cash transfers as the best estimate of rural cash incomes in Malawi a Gini coefficient of 0.5655 (Table 5.1.4) for 1968/69 was close to reported Gini coefficients for other developing countries. A study of personal income distribution in the agricultural sector in Colombia for 1960 estimated a Gini coefficient of 0.58[1] and a more recent study of cocoa producers in Western Nigeria came up with a Gini coefficient of 0.78[2] for the period 1967-69. Because of heterogeneous factors, it is difficult to generalize about the relative inequality of personal income distribution from these Gini coefficients.

## Regional Income Distribution

### Inequality, 1968/69

As in the national income distributions, the uppermost classes in the regional income distributions accounted for a disproportionate share of income. In the Northern Region the uppermost class (K200.01 and over) accounted for only 2.51 percent[3] of households but earned 5.79 percent

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[1] R.A. Berry, "Farm Size Distribution, Income Distribution, and the Efficiency of Agricultural Production: Colombia," The American Economic Review, 62 (May, 1972), p. 403.

[2] S.M. Essang, "The Distribution of Earnings in the Cocoa Economy of Western Nigeria: Implications for Development" (Ph.D. Thesis, Michigan State University, 1970), p. 44.

[3] All percentage shares in this paragraph are from Table B.2 in Appendix B.

of gross farm cash income, 4.48 percent of net farm cash income, 34.23 percent of net farm cash income plus off-farm cash income and 28.23 percent of net farm cash income plus off-farm cash income plus cash transfers. In the Central Region the uppermost class accounted for 1.4 percent of households but received 9.29 percent of gross farm cash income, 9.11 percent of net farm cash income, 9.15 percent of net farm cash income plus off-farm cash income and 16.93 percent of net farm cash income plus off-farm cash income plus cash transfers. In the Southern Region only 2.8 percent of the households were in the uppermost class but they accounted for 9.67 percent of gross farm cash income, -0.89 pertent of net farm cash income, 28.85 percent of net farm cash income plus off-farm cash income and 25.20 percent of net farm cash income plus off-farm cash income cash transfers. For all three regions at least 40 percent of the households were in the lowest income class (K0.00 - K10.00) and they accounted for no more than 12.98 percent of any definition of rural cash income.

The rankings of regional income distributions by the standard deviation of logarithms and Atkinson's measure are presented in Table 5.4. The rankings show that the Southern Region had the most equal distribution of gross farm cash income while the Central Region had the most unequal regional distribution of gross farm cash income. The Nothern Region had the most unequal distribution of net farm cash income, while the Central Region had the most

TABLE 5.4

RANKING OF REGIONS FROM MOST EQUAL DISTRIBUTION OF INCOME TO LEAST EQUAL BY DEFINITION OF INCOME

| Measure of Inequality | Gross Farm Cash Income | | | Net Farm Cash Income | | | Net Farm Cash Income Plus Off-Farm Cash Income | | | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | North | Central | South | North | Central | South | North | Central | South | North | Central | South |
| Standard Deviation of Logs | 2 | 3 | 1 | - | - | - | 3 | 1 | 2 | 1 | 2 | 3 |
| Atkinson's Measure $\varepsilon = 3$ | 2 | 3 | 1 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 3 |

equal distribution. Net farm cash income plus off-farm cash income was again most unequal in the Northern Region and most equal in the Central Region. Net farm cash income plus off-farm cash income plus cash transfers was least unequal in the Northern Region and most unequal in the Southern Region. For all three regions the standard deviation of logarithms and Atkinson's measure of inequality indicated that net farm cash income plus off-farm cash income plus cash transfers was the least unequally distributed definition of rural income in 1968/69 except for the Southern Region where gross farm cash income had the lowest value of Atkinson's measure (Table 5.1). Net farm cash income plus off-farm cash income was the most unequally distributed definition of rural cash income in all three regions.

## District Income Distribution Inequality, 1968/69

Rankings of district income distributions by the various summary measures are presented in Table 5.5. The rankings indicate that there is considerable discrepancy in the rankings by the various measures. These ranking discrepancies are not very surprising when you consider that each summary measure of inequality places emphasis on different aspects of the distribution of income as pointed

TABLE 5.5.1

RANKINGS OF DISTRICTS FROM MOST EQUAL TO LEAST EQUAL DISTRIBUTION OF INCOME BY MEASURE OF INEQUALITY AND DEFINITION OF RURAL CASH INCOME (GROSS FARM CASH INCOME)

| District | Standard Deviation of Logarithms | Atkinson's Measure $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | 14 | 14 | 11 | 12 | 8 |
| Karonga | 18 | 21 | 1 | 15 | 1 |
| Nkhata Bay | 20 | 17 | 17 | 11 | 16 |
| Rumpi | 16 | 16 | 12 | 13 | 11 |
| Mzimba | 12 | 12 | 14 | 10 | 12 |
| Kasungu | 7 | 5 | 13 | 14 | 14 |
| Nkhota Kota | 22 | 22 | 22 | 23 | 22 |
| Ntchisi | 17 | 15 | 21 | 18 | 20 |
| Dowa | 15 | 19 | 16 | 21 | 15 |
| Salima | 19 | 18 | 20 | 17 | 19 |
| Lilongwe | 13 | 13 | 15 | 19 | 17 |
| Mchinji | 21 | 20 | 19 | 22 | 18 |
| Dedza | 11 | 10 | 18 | 16 | 21 |
| Ncheu | 23 | 23 | 23 | 20 | 23 |
| Mangochi | 5 | 2 | 9 | 1 | 13 |
| Kasupe | 1 | 1 | 4 | 2 | 5 |
| Zomba | 8 | 6 | 8 | 4 | 10 |
| Chiradzulu | 2 | 4 | 2 | 6 | 3 |
| Blantyre | 6 | 9 | 5 | 9 | 4 |
| Thyolo | 10 | 11 | 10 | 7 | 9 |
| Mulanje | 9 | 7 | 7 | 3 | 6 |
| Chikwawa | 3 | 8 | 3 | 8 | 2 |
| Nsanje | 4 | 3 | 6 | 5 | 7 |

TABLE 5.5.2

RANKINGS OF DISTRICTS FROM MOST EQUAL TO LEAST EQUAL DISTRIBUTION OF INCOME BY MEASURE OF INEQUALITY AND DEFINITION OF RURAL CASH INCOME (NET FARM CASH INCOME)

| District | Standard Deviation of Logarithms | Atkinson's Measure $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | -- | 16 | -- | 11 | 5 |
| Karonga | -- | 14 | -- | 12 | 1 |
| Nkhata Bay | -- | 23 | -- | 23 | 23 |
| Rumpi | -- | 17 | -- | 13 | 6 |
| Mzimba | -- | 10 | -- | 10 | 10 |
| Kasungu | -- | 1 | -- | 14 | 12 |
| Nkhota Kota | -- | 11 | -- | 15 | 17 |
| Ntchisi | -- | 12 | -- | 18 | 20 |
| Dowa | -- | 15 | -- | 21 | 13 |
| Salima | -- | 18 | -- | 17 | 18 |
| Lilongwe | -- | 8 | -- | 19 | 15 |
| Mchinji | -- | 21 | -- | 22 | 16 |
| Dedza | -- | 5 | -- | 16 | 21 |
| Ncheu | -- | 13 | -- | 20 | 22 |
| Mangochi | -- | 22 | -- | 2 | 19 |
| Kasupe | -- | 2 | -- | 1 | 4 |
| Zomba | -- | 9 | -- | 4 | 14 |
| Chiradzulu | -- | 3 | -- | 6 | 2 |
| Blantyre | -- | 7 | -- | 7 | 7 |
| Thyolo | -- | 20 | -- | 9 | 11 |
| Mulanje | -- | 19 | -- | 5 | 9 |
| Chikwawa | -- | 6 | -- | 8 | 3 |
| Nsanje | -- | 4 | -- | 3 | 8 |

TABLE 5.5.3

RANKINGS OF DISTRICTS FROM MOST EQUAL TO LEAST EQUAL DISTRIBUTION OF INCOME BY MEASURE OF INEQUALITY AND DEFINITION OF RURAL CASH INCOME (NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME)

| District | Standard Deviation of Logarithms | Atkinson's Measure $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | 18 | 17 | 17 | 16 | 18 |
| Karonga | 8 | 18 | 5 | 19 | 4 |
| Nkhata Bay | 23 | 23 | 22 | 22 | 22 |
| Rumpi | 15 | 13 | 14 | 11 | 15 |
| Mzimba | 6 | 5 | 9 | 5 | 14 |
| Kasungu | 1 | 1 | 1 | 1 | 1 |
| Nkhota Kota | 4 | 3 | 2 | 4 | 10 |
| Ntchisi | 22 | 22 | 21 | 23 | 13 |
| Dowa | 5 | 7 | 4 | 12 | 8 |
| Salima | 7 | 6 | 7 | 3 | 5 |
| Lilongwe | 3 | 4 | 3 | 9 | 11 |
| Mchinji | 16 | 20 | 10 | 14 | 2 |
| Dedza | 2 | 2 | 6 | 6 | 19 |
| Ncheu | 11 | 9 | 20 | 17 | 23 |
| Mangochi | 12 | 8 | 12 | 2 | 3 |
| Kasupe | 10 | 10 | 16 | 13 | 21 |
| Zomba | 20 | 16 | 19 | 15 | 20 |
| Chiradzulu | 9 | 11 | 8 | 10 | 6 |
| Blantyre | 21 | 21 | 15 | 21 | 12 |
| Thyolo | 13 | 12 | 6 | 8 | 16 |
| Mulanje | 19 | 15 | 11 | 7 | 7 |
| Chikwawa | 14 | 19 | 13 | 20 | 9 |
| Nsanje | 17 | 14 | 18 | 18 | 17 |

TABLE 5.5.4

RANKINGS OF DISTRICTS FROM MOST EQUAL TO LEAST EQUAL DISTRIBUTION OF INCOME BY MEASURE OF INEQUALITY AND DEFINITION OF RURAL CASH INCOME (NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME PLUS CASH TRANSFERS)

| District | Standard Deviation of Logarithms | Atkinson's Measure ε = 3 | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|
| Chitipa | 9 | 7 | 10 | 16 | 16 |
| Karonga | 7 | 10 | 8 | 19 | 5 |
| Nkhata Bay | 23 | 21 | 23 | 23 | 22 |
| Rumpi | 8 | 8 | 9 | 12 | 13 |
| Mzimba | 1 | 1 | 2 | 4 | 3 |
| Kasungu | 3 | 3 | 1 | 2 | 1 |
| Nkhota Kota | 5 | 5 | 4 | 5 | 7 |
| Ntchisi | 14 | 12 | 14 | 8 | 17 |
| Dowa | 15 | 19 | 13 | 15 | 11 |
| Salima | 6 | 6 | 6 | 3 | 4 |
| Lilongwe | 11 | 14 | 12 | 11 | 12 |
| Mchinji | 22 | 23 | 21 | 21 | 15 |
| Dedza | 4 | 4 | 7 | 6 | 8 |
| Ncheu | 19 | 18 | 22 | 18 | 23 |
| Mangochi | 2 | 2 | 3 | [illegible] | [illegible] |
| Kasupe | 12 | 11 | 16 | 13 | [illegible] |
| Zomba | 17 | 16 | 18 | 14 | [illegible] |
| Chiradzulu | 13 | 13 | 11 | 9 | 8 |
| Blantyre | 21 | 22 | 20 | [illegible] | 14 |
| Thyolo | 16 | 15 | 15 | [illegible] | 9 |
| Mulanje | 10 | 9 | 5 | [illegible] | 6 |
| Chikwawa | 20 | 20 | [illegible] | [illegible] | [illegible] |
| Nsanje | 18 | [illegible] | 19 | [illegible] | 19 |

out in Chapter III. The Spearman rank correlation test[1] was used to test the ranking discrepancy between the rankings by the standard deviation of logarithms and the rankings by the other summary measures. The results of the test show that the null hypothesis (i.e., that the ranking of net farm cash income plus off-farm cash income by the standard deviation of logarithms is unrelated to the ranking by the coefficient of variation) cannot be rejected at the 0.01 percent significance level (Table 5.6). The rest of the rankings are, with 99.99 percent confidence, essentially the same as the ranking by the standard deviation of logarithms.

Dividing the districts into three levels of relative inequality in the distribution of rural cash income provided a simple method for comparing district income distribution inequality. Group one consisted of the seven districts ranked most equal, group two consisted of the next seven districts in the district rankings and group three was composed of the nine lowest ranked districts. The results of the groupings are shown on Maps 5.1 to 5.4 and are summarized in Table 5.7.

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[1] Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (Toronto: McGraw-Hill Book Company, 1956).

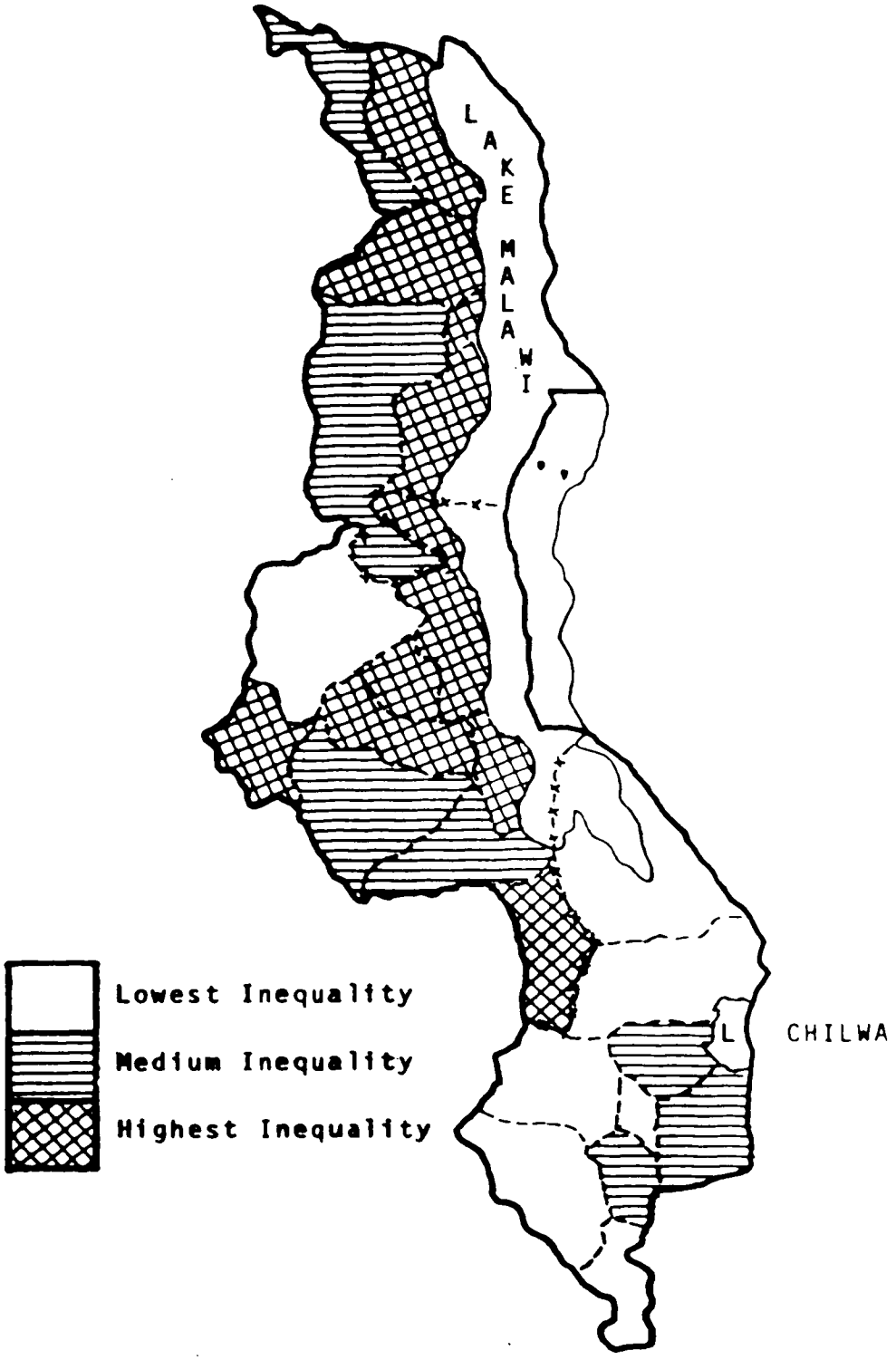
TABLE 5.6

SPEARMAN RANK CORRELATION COEFFICIENTS OF DISTRICT RANKINGS

| Definition of Income | Standard Deviation of Logarithms Versus: Atkinson's Measure $\varepsilon = 3$ | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|
| Gross Farm Cash Income | .9496 | .7670 | .8094 | .6751 |
| Net Farm Cash Income | -- | -- | -- | -- |
| Net Farm Cash Income Plus Off-Farm Cash Income | .8914 | .8277 | .6815 | .3216* |
| Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers | .9733 | .9546 | .8302 | .6485 |

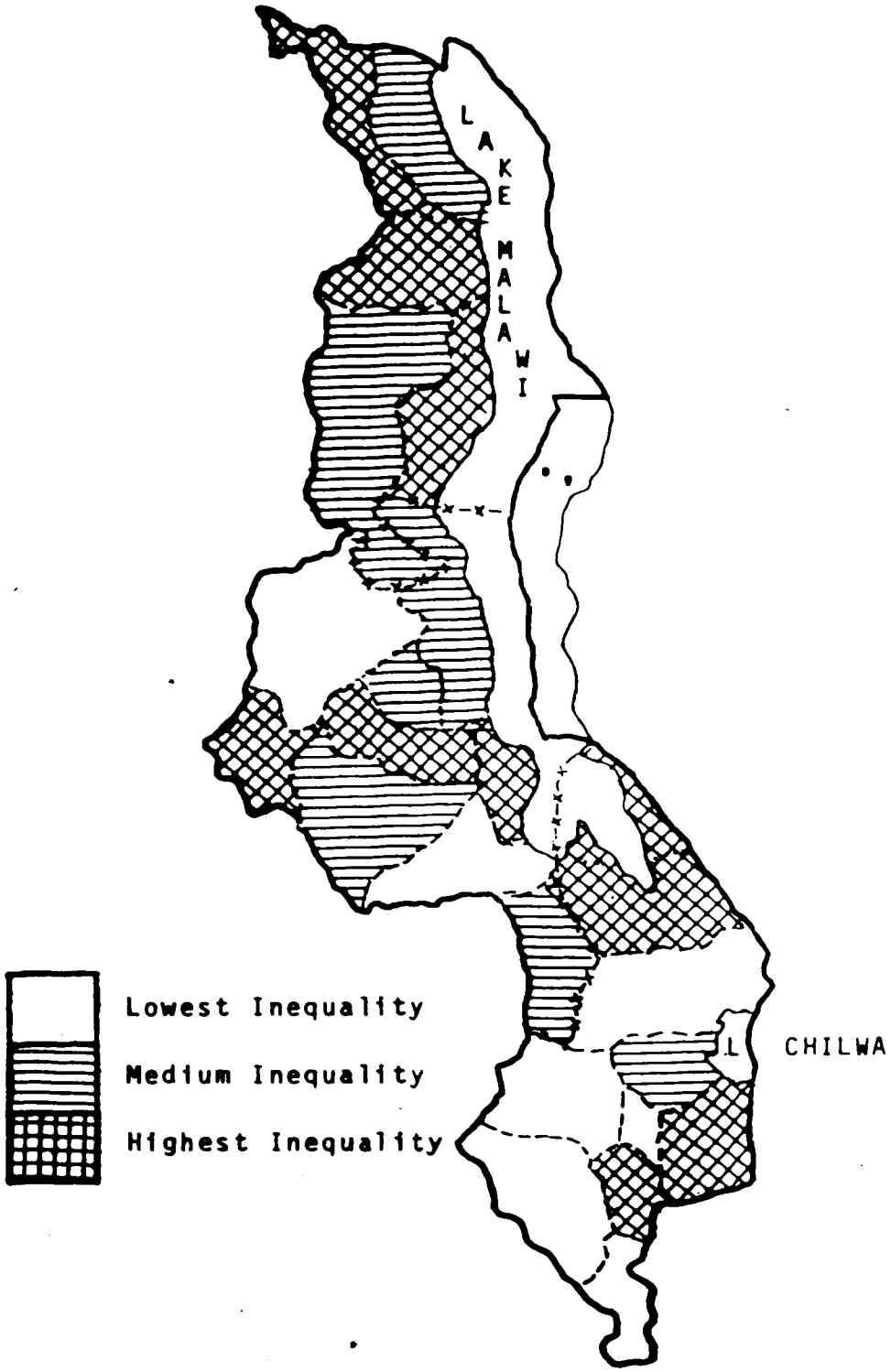
* Not significant at the 0.01 percent significance level.

MAP 5.1



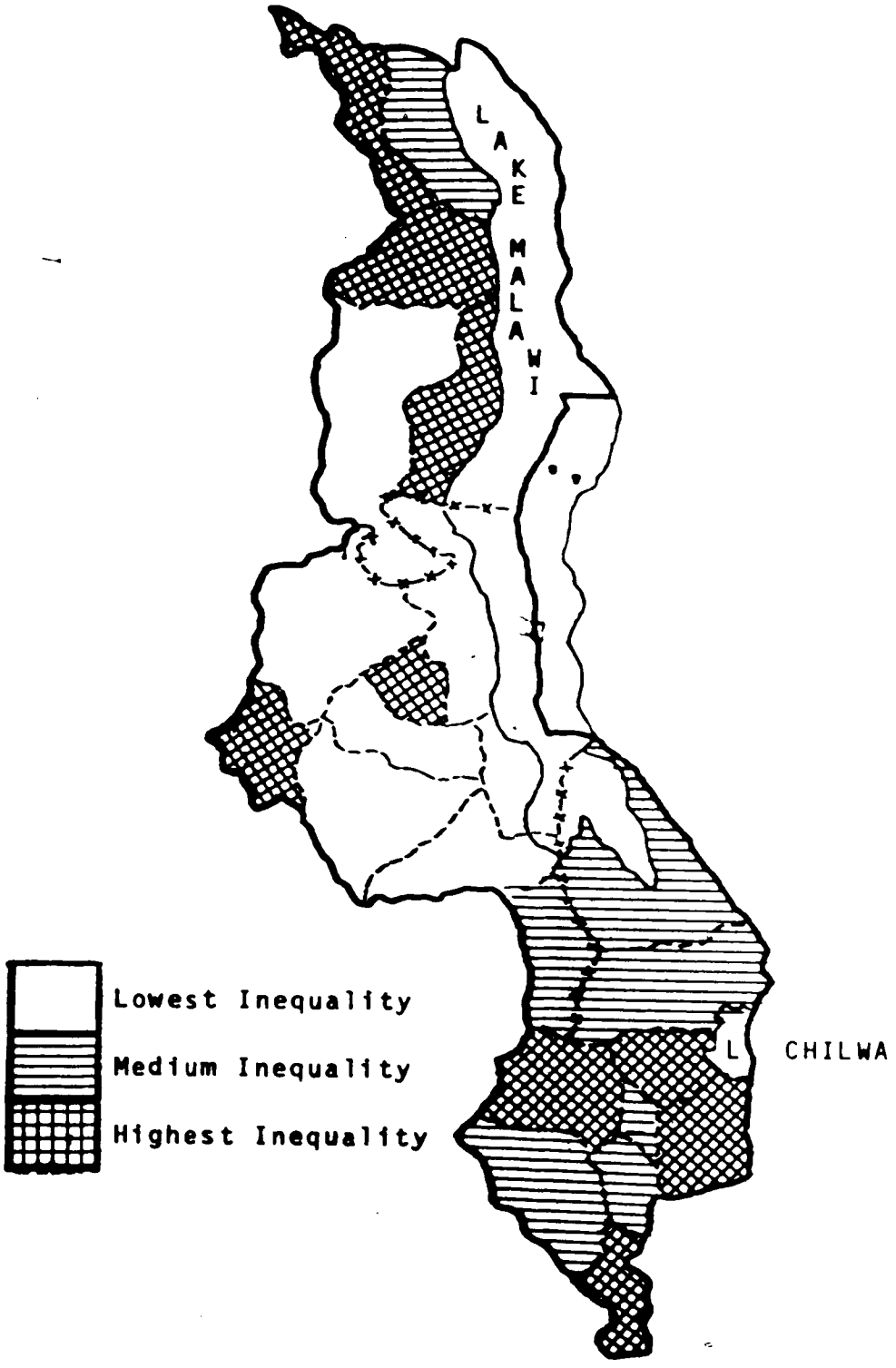

LEVELS OF DISTRICT INCOME INEQUALITY IN THE DISTRIBUTION OF GROSS FARM CASH INCOME

MAP 5.2



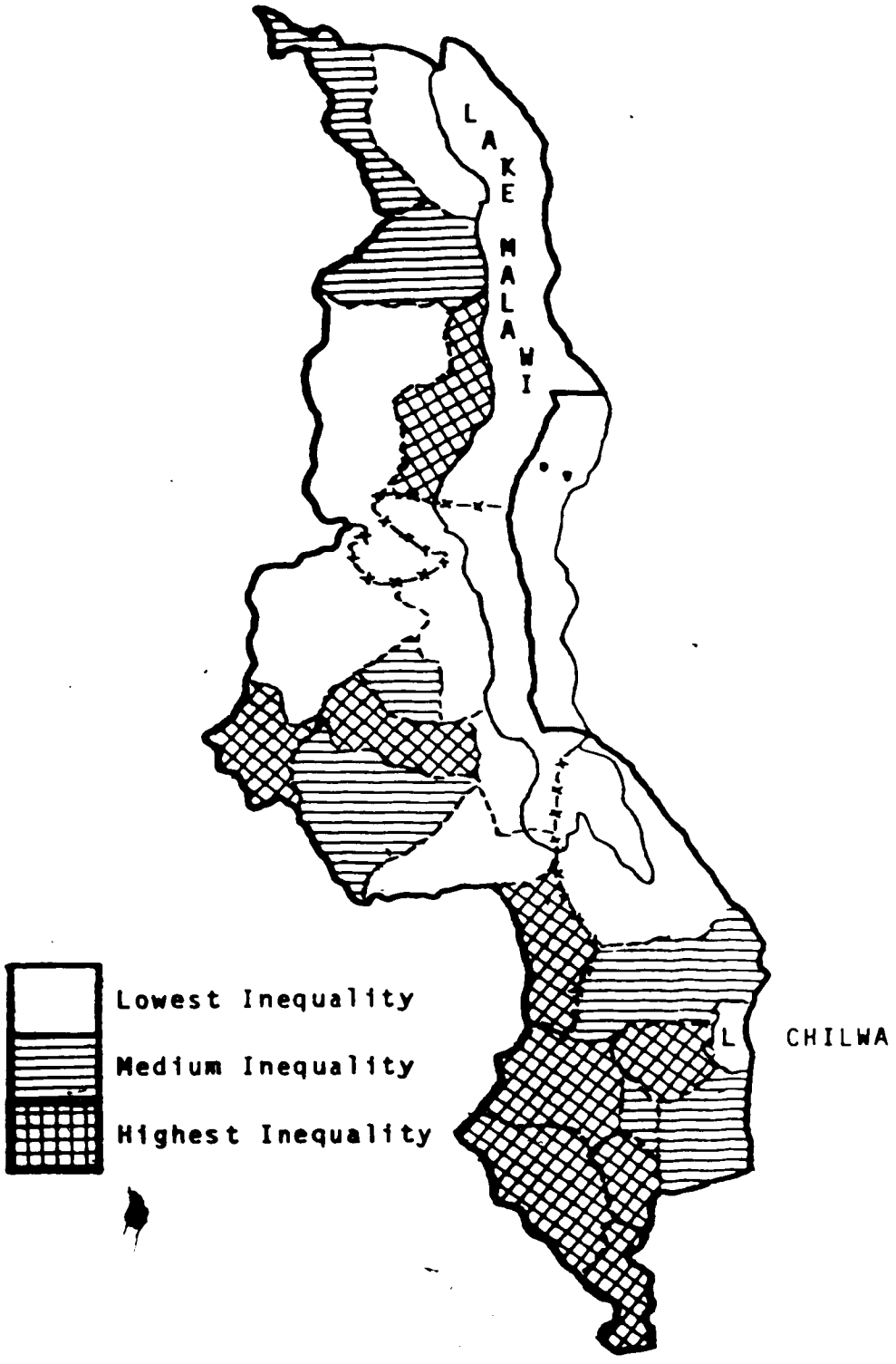

LEVELS OF DISTRICT INCOME INEQUALITY IN THE DISTRIBUTION OF NET FARM CASH INCOME

MAP 5.3




LEVELS OF DISTRICT INCOME INEQULAITY IN THE DISTRIBUTION OF NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME

MAP 5.4




LEVELS OF DISTRICT INCOME INEQUALITY IN THE DISTRIBUTION OF NET FARM CASH INCOME PLUS OFF-FARM CASH INCOME PLUS CASH TRANSFERS

TABLE 5.7

SUMMARY RESULTS OF DISTRICT RELATIVE INEQUALITY GROUPING

| Definition of Income | Relative Inequality Group | Number of Districts Per Inequality by Region | | |
|---|---|---|---|---|
| | | Northern | Central | Southern |
| Gross Farm Cash Income | Lowest inequality | 0 | 1 | 6 |
| | Medium inequality | 2 | 2 | 3 |
| | Highest inequality | 3 | 6 | 0 |
| Net Farm Cash Income | Lowest inequality | 0 | 2 | 5 |
| | Medium inequality | 2 | 4 | 1 |
| | Highest inequality | 3 | 3 | 3 |
| Net Farm Cash Income Plus Off-Farm Cash Income | Lowest inequality | 1 | 6 | 0 |
| | Medium inequality | 1 | 1 | 5 |
| | Highest inequality | 3 | 2 | 4 |
| Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers | Lowest inequality | 2 | 4 | 1 |
| | Medium inequality | 2 | 2 | 3 |
| | Highest inequality | 1 | 3 | 5 |

## District Income Distribution and the Distribution of Rural Development Projects in Malawi

Rural development projects in Malawi are planned to provide employment opportunities in the rural areas and balance farm budgets which would provide the rural people with large increases in net income. Income generated within the rural areas (net farm cash income plus off-farm cash income) is therefore used as a basis for the comparison of income distribution inequality and the location of the major rural development projects.

The results indicate that none of the four major rural development projects operating in 1973 (Karonga Rural Development Project, Central Region Lakeshore Development Project, Lilongwe Land Development Program, and Lower Shire Valley Development Project) were located in the districts categorized as depicting the highest level of income distribution inequality in 1968/69. The Lilongwe Land Development Program and the Central Region Lakeshore Development Project were in districts which showed relatively the lowest level of inequality. The Lower Shire Valley Development Project and the Karonga Rural Development Project were in districts which depicted medium inequality levels.

The results of the measurement of the 1968/69 income distribution inequality in the four major project areas are presented in Table 5.8. The Lilongwe Land Development

TABLE 5.8

SUMMARY MEASURES OF THE 1968/69 DISTRIBUTION OF INCOME IN THE MAJOR PROJECT AREAS BY DEFINITION OF INCOME

| Definition of Income | Project Area | Standard Deviation of Logarithms | Atkinson's Measure ε = 3 | Gini Coefficient | Variance | Coefficient of Variation |
|---|---|---|---|---|---|---|
| Gross Farm Cash Income | KRDP | .5011 | .7804 | .3595 | 217.3 | .6976 |
| | CRCLP | .6112 | .7487 | .6455 | 333.0 | 1.6196 |
| | LLDP | .4575 | .7111 | .4564 | 363.9 | .8769 |
| | LSVDP | .3756 | .6203 | .3618 | 83.1 | .6896 |
| Net Farm Cash Income | KRDP | .5499 | .8297 | .3389 | 148.0 | .6974 |
| | CRLDP | .6809 | .7954 | .6734 | 237.8 | 1.6663 |
| | LLDP | .4575 | .7101 | .4541 | 363.9 | .8796 |
| | LSVDP | -- | .6301 | -- | 29.7 | .6043 |
| Net Farm Cash Income Plus Off-Farm Cash Income | KRDP | .7649 | .9160 | .6365 | 11,197.6 | 1.5085 |
| | CRLDP | .6843 | .7986 | .6873 | 1,191.7 | 1.8566 |
| | LLDP | .4883 | .7445 | .5144 | 3,692.7 | 1.3671 |
| | LSVDP | .6275 | .8464 | .6043 | 7,523.3 | 1.4975 |
| Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers | KRDP | .5065 | .7129 | .5639 | 11,416.9 | 1.3588 |
| | CRLDP | .4414 | .5890 | .5466 | 1,345.0 | 1.5112 |
| | LLDP | .4166 | .6412 | .4779 | 4,003.1 | 1.2635 |
| | LSVDP | .4454 | .6296 | .5360 | 7,513.4 | 1.3492 |

KRDP = Karonga Rural Development Project.
CRLDP = Central Region Lakeshore Development Project.
LLDP = Lilongwe Land Development Program.
LSVDP = Lower Shire Valley Development Project.

Program and Lower Shire Valley Development Project areas had lower levels of inequality in the distribution of both net farm cash income plus off-farm cash income and net farm cash income plus off-farm cash income plus cash transfers than the respective district inequality levels (Lilongwe and Chikwawa districts, respectively, Table 5.1). Both Karonga Rural Development Project and Central Region Lakeshore Development Project areas had higher levels of inequality in the distribution of net farm cash income plus off-farm cash income and net farm cash income plus off-farm cash income plus cash transfers than the respective district inequality levels (Karonga and Salima districts, respectively, Table 5.1). It would be interesting for policy purposes to analyze the effects of these four rural development projects on income distribution inequality. The 1968/69 results of income inequality in Malawi (Tables 5.1 and 5.8) form a good basis for such an analysis since there were no major rural development projects prior to 1968.[1] However, such an exercise is beyond the scope of this study.

## General Conclusions

The results indicate that rural incomes in Malawi were

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[1] Lilongwe Land Development Program was the first major rural development project. It was launched in 1968 but it was preceded by a pilot project in effect from 1965 to 1967.

unequally distributed in 1968/69. The uppermost income groups accounted for a disproportionate share of income compared to the proportion of households. Income generated within the rural areas (net farm cash income plus off-farm cash income) was the most unequally distributed income on a national level, in the Northern and Central Regions and in all 23 districts. Gross farm cash income was the most unequally distributed income in the Southern Region. Net farm cash income plus off-farm cash income plus cash transfers was the least unequally distributed income at all levels.

With respect to the distribution of rural development projects the results show that no major rural development project was located in the nine districts which had the lowest inequality level in the distribution of the 1968/69 net farm cash income plus off-farm cash income. Two of the four project areas showed lower levels of inequality than their respective district inequalities and the other two project areas showed higher levels of inequality than the distribution of their respective districts' net farm cash income plus off-farm cash income and net farm cash income plus off-farm cash income plus cash transfers.

# CHAPTER VI

# CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was (a) to measure the level and degree of the 1968/69 rural income distribution inequality in Malawi and (b) to find out if the distribution of rural development projects meets the government's strategy of spreading the fruits of development as evenly as possible throughout all sections of the population and all parts of the country.

A number of limitations are inherent in this study. In the first place, the estimates of income distribution presented in the study do not accurately reflect the inequality of lifetime income. A second limitation arises from the absence of income in kind and cost of living differences between regions and income groups. Nevertheless, with all these limitations in mind, several conclusions may be inferred from the results presented in the preceding chapter.

## Conclusions

The first conclusion is that rural cash incomes, regardless of definition of rural cash income, were unequally distributed in 1968/69 on all three levels, i.e., national, regional and district. The uppermost groups

accounted for a disporportionate share of income.

A second conclusion is that income generated within the rural area (net farm cash income plus off-farm cash income) was the most unequally distributed income on all levels except in the Southern Region where gross farm cash income showed the most serious disparity. Net farm cash income plus off-farm cash income plus cash transfers was the least unequally distributed income.

The third conclusion is that the level and degree of regional income distribution inequality corresponded to the development emphasis placed on the three regions during the colonial era. Using net farm cash income plus off-farm cash income plus cash transfers as an estimate of total rural cash income, the regional inequality results indicated that cash income was least unequally distributed in the Northern Region, where development emphasis was minimal, and most unequally distributed in the Southern Region, where most of the development emphasis was placed during the colonial era. This conclusion seems to contradict the claim that economic development generates "forces that operate to make the income distribution more equal."[1] However, other factors such as the population density mentioned in Chapter I may have contributed to the differences in income distribution disparity rather than economic develop-

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[1] I. Kravis, "International Differences in the Distribution of Income," Review of Economics and Statistics, 42 (November, 1960), p. 414.

ment alone. It is beyond the scope of this study to identify and analyze factors which could account for the differences in the levels of the 1968/69 income distribution inequality in Malawi.

Fourth, the district inequality results indicated that Nkhata Bay and Mchinji districts had the most unequal income distribution in 1968/69 while Kasungu district had the least unequal distribution. Nkhata Bay and Mchinji districts were classed under the most unequal income distribution group for all definitions of income while Kasungu was the only district classed under the least unequal distribution group for all definitions of income (Maps 5.1 and 5.4).

The fifth conclusion is that none of the four major rural development projects (Karonga Rural Development Project, Central Region Lakeshore Development Project, Lilongwe Land Development Program and Lower Shire Valley Development Project) were in districts which had the most unequal distribution of income generated within the rural areas. It will be an interesting proposition for future investigation to see what effect these four major rural development projects have had on the level of income distribution within the project areas and on the regional levels of income inequality.

## Recommendations

The study has documented in quantitative terms the rural income distribution disparity in Malawi on a national, regional and district level for the first time. However, calculating the level and degree of income inequality depends to some extent upon the accuracy and limitations of the data being used. There is a definite need for more accurate data which would take into account not only cash income but also income in kind and cost-of-living differences between regions and different income groups. The first recommendation, therefore, is that income distribution data collection be incorporated into regular surveys and censuses of Malawi.

A second recommendation is that a further study into how to reduce income inequality in Malawi should be undertaken. An attempt should be made to identify and examine the leading factors contributing to income distribution inequality. Reasons for inequality of incomes (and of earnings) have been studied and quantified for a number of countries. Therefore, using similar techniques, it should be possible to carry out a detailed study of Malawi in order to identify leading factors which contribute to more or less equal income distributions.

Finally, development projects should at least be neutral to the distribution of income; otherwise, the level of inequality within project areas or on a national level

may worsen. Income distribution within each rural development project should, therefore, be included as an additional criterion for project performance in order to ensure that development is improving, rather than worsening, the distribution of income.

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# APPENDIX A

# APPENDIX A

## LINEAR APPROXIMATION OF THE GINI COEFFICIENT

The Gini coefficient is defined as the area between the diagonal and the Lorenz curve (area A in Diagram A.1) divided by the total area under the diagonal $(A + B)$[1], i.e., A/A + B. The area under the diagonal,

$$A + B = \frac{1}{2} (100 \times 100)$$

$$= 5000$$

$$\text{Gini coefficient} = \frac{A}{A+B} = \frac{A+B-B}{A+B} = \frac{A+B}{A+B} - \frac{B}{A+B}$$

$$= \frac{5000}{5000} - \frac{B}{5000}$$

$$= 1 - \frac{B}{5000}$$

Area B can be calculated by finding the areas of the m trapeziums and summing them up as follows:

Area of a trapezium = $\frac{1}{2}$ (distance between parallel sides of trapezium) x (sum of the parallel sides of the trapezium)

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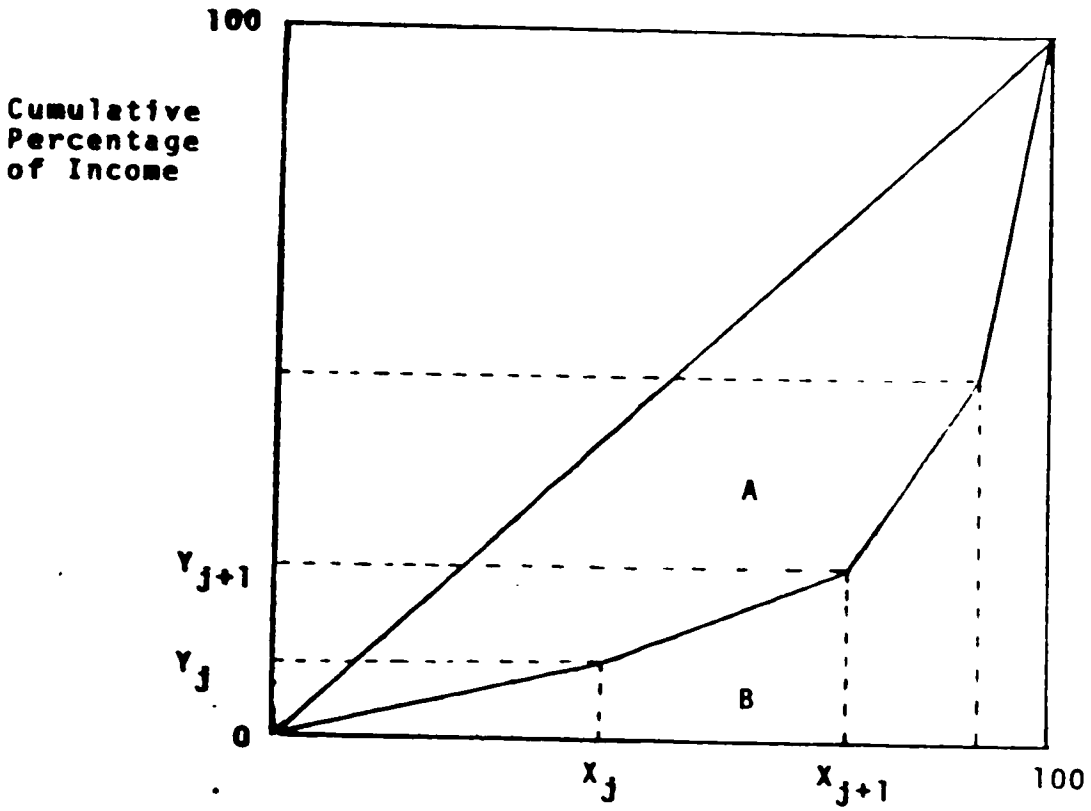
[1] Sen, On Economic Inequality, p. 30.

DIAGRAM A.1

LINEAR APPROXIMATION OF GINI COEFFICIENT



In Diagram A.1

Distance between parallel sides of trapezium = the percentage difference of households per group between adjacent groups

$$= X_{j+1} - X_j \quad \text{where} \quad X_1 = 0$$

Sum of parallel sides = sum of the cumulative percentage of income for the two adjacent groups

$$= Y_j + Y_{j+1} \quad \text{where} \quad Y_1 = 0$$

$$\therefore B = \sum_{j=1}^{\blacksquare} \frac{1}{2} (X_{j+1} - X_j)(Y_j + Y_{j+1})$$

$$\therefore \text{Gini coefficient} = 1 - \frac{\sum_{j=1}^{\blacksquare} \frac{1}{2} (X_{j+1} - X_j)(Y_j + Y_{j+1})}{5000}$$

# APPENDIX B

TABLE B.1

DISTRIBUTION OF INCOME BY ECONOMIC CLASS AND BY DEFINITION OF INCOME

MALAWI

| Economic Class | Number of Households (H) | Gross Farm Cash Income (G) | Net Farm Cash Income (N) | Net Farm Cash Income Plus Off-Farm Cash Income ($N_W$) | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 377,010 | 925,905 | 527,415 | 1,336,581 | 3,625,137 |
| 10.01 - 20.00 | 170,805 | 1,486,004 | 1,204,175 | 2,664,558 | 3,677,432 |
| 20.01 - 30.00 | 93,810 | 1,376,193 | 1,136,977 | 2,390,279 | 2,863,081 |
| 30.01 - 40.00 | 58,410 | 1,177,546 | 995,306 | 2,153,577 | 2,518,639 |
| 40.01 - 50.00 | 35,400 | 709,416 | 566,046 | 1,592,292 | 1,732,476 |
| 50.01 - 60.00 | 25,665 | 644,192 | 488,662 | 1,380,777 | 1,795,780 |
| 60.01 - 80.00 | 46,020 | 1,274,294 | 958,136 | 3,201,151 | 3,378,328 |
| 80.01 - 120.00 | 30,975 | 1,147,314 | 842,830 | 3,065,906 | 3,226,666 |
| 120.01 - 200.00 | 27,435 | 1,467,773 | 1,118,251 | 4,186,307 | 4,437,611 |
| 200.01 + | 20,355 | 994,545 | 448,421 | 7,828,940 | 8,055,898 |

TABLE B.1 (CONTINUED)

SOUTHERN REGION

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 197,087 | 434,304 | 156,343 | 640,718 | 1,895,229 |
| 10.01 - 20.00 | 78,925 | 604,566 | 474,339 | 1,183,875 | 1,661,371 |
| 20.01 - 30.00 | 43,296 | 503,965 | 358,491 | 1,081,534 | 1,278,098 |
| 30.01 - 40.00 | 24,354 | 364,823 | 284,211 | 961,983 | 1,066,218 |
| 40.01 - 50.00 | 18,491 | 237,609 | 162,166 | 830,616 | [illegible] |
| 50.01 - 60.00 | 15,785 | 273,712 | 179,633 | 854,600 | 1,[illegible] |
| 60.01 - 80.00 | 27,962 | 378,179 | 196,293 | 1,938,606 | 2,[illegible] |
| 80.01 - 120.00 | 19,844 | 551,465 | 343,103 | 1,945,903 | 2,041,948 |
| 120.01 - 200.00 | 13,079 | 467,967 | 305,002 | 1,943,670 | 1,977,414 |
| 200.01 + | 12,628 | 408,648 | -21,846 | 4,615,787 | 4,710,749 |

CENTRAL REGION

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 126,760 | 362,635 | 283,764 | 524,050 | 1,074,519 |
| 10.01 - 20.00 | 70,035 | 680,040 | 559,580 | 1,163,982 | 1,518,359 |
| 20.01 - 30.00 | 37,077 | 571,727 | 503,506 | 907,645 | 1,031,111 |
| 30.01 - 40.00 | 25,669 | 633,254 | 550,087 | 901,495 | 1,097,093 |
| 40.01 - 50.00 | 12,993 | 363,804 | 307,934 | 580,008 | 640,945 |
| 50.01 - 60.00 | 8,239 | 315,554 | 257,634 | 436,255 | 550,118 |
| 60.01 - 80.00 | 13,310 | 715,146 | 624,239 | 924,380 | 991,196 |
| 80.01 - 120.00 | 7,289 | 445,212 | 381,069 | 752,516 | 802,300 |
| 120.01 - 200.00 | 11,092 | 820,919 | 667,738 | 1,761,631 | 1,954,410 |
| 200.01 + | 4,437 | 502,490 | 414,682 | 1,883,507 | 1,969,052 |

TABLE B.1 (CONTINUED)

NORTHERN REGION

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 52,929 | 126,921 | 86,285 | 167,813 | 651,637 |
| 10.01 - 20.00 | 21,546 | 197,577 | 168,274 | 312,848 | 491,464 |
| 20.01 - 30.00 | 13,115 | 295,219 | 270,038 | 392,663 | 543,223 |
| 30.01 - 40.00 | 7,963 | 170,886 | 154,004 | 274,405 | 337,074 |
| 40.01 - 50.00 | 4,567 | 120,889 | 106,228 | 211,041 | 236,708 |
| 50.01 - 60.00 | 1,757 | 56,259 | 51,990 | 96,143 | 109,777 |
| 60.01 - 80.00 | 4,216 | 143,471 | 123,360 | 300,938 | 318,224 |
| 80.01 - 120.00 | 4,099 | 161,460 | 126,659 | 393,299 | 409,736 |
| 120.01 - 200.00 | 3,279 | 174,213 | 140,768 | 482,046 | 504,868 |
| 200.01 + | 3,396 | 88,941 | 57,630 | 1,369,403 | 1,416,879 |

CHITIPA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 6,034 | 14,673 | 10,107 | 19,595 | 74,496 |
| 10.01 - 20.00 | 2,851 | 26,144 | 22,266 | 41,397 | 65,031 |
| 20.01 - 30.00 | 1,541 | 34,688 | 31,729 | 46,138 | 63,828 |
| 30.01 - 40.00 | 864 | 18,541 | 16,709 | 29,773 | 36,573 |
| 40.01 - 50.00 | 605 | 16,014 | 14,072 | 27,957 | 31,357 |
| 50.01 - 60.00 | 432 | 13,833 | 12,783 | 23,639 | 26,991 |
| 60.00 - 80.00 | 518 | 17,628 | 15,157 | 36,975 | 39,099 |
| 80.01 - 120.00 | 864 | 34,033 | 26,698 | 82,901 | 86,365 |
| 120.01 - 200.00 | 302 | 16,345 | 12,965 | 44,397 | 46,499 |
| 200.01 + | 389 | 10,188 | 6,621 | 156,860 | 162,299 |

TABLE B.1 (CONTINUED)

KARONGA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 3,612 | 5,086 | 6,452 | 12,421 | 44,847 |
| 10.01 - 20.00 | 3,360 | 30,811 | 26,242 | 48,787 | 76,642 |
| 20.01 - 30.00 | 2,638 | 59,381 | 54,316 | 78,982 | 109,266 |
| 30.01 - 40.00 | 1,898 | 40,731 | 36,707 | 65,405 | 80,342 |
| 40.01 - 50.00 | 974 | 25,782 | 22,655 | 45,009 | 50,482 |
| 50.01 - 60.00 | 470 | 15,049 | 13,907 | 25,718 | 29,366 |
| 60.01 - 80.00 | 1,193 | 40,598 | 34,907 | 85,156 | 90,048 |
| 80.01 - 120.00 | 974 | 38,366 | 30,096 | 93,455 | 97,361 |
| 120.01 - 200.00 | 1,025 | 54,458 | 44,003 | 150,685 | 157,819 |
| 200.01 + | 638 | 16,709 | 10,827 | 257,267 | 266,186 |

NKHATA BAY

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 14,280 | 31,277 | 19,338 | 38,513 | 173,172 |
| 10.01 - 20.00 | 1,632 | 14,965 | 12,746 | 23,697 | 37,226 |
| 20.01 - 30.00 | 1,944 | 43,759 | 40,027 | 58,203 | 80,520 |
| 30.01 - 40.00 | 1,632 | 35,023 | 31,563 | 56,239 | 69,083 |
| 40.01 - 50.00 | 960 | 25,411 | 22,329 | 44,362 | 49,757 |
| 50.01 - 60.00 | 336 | 10,759 | 9,942 | 18,386 | 20,993 |
| 60.01 - 80.00 | [illegible] | 0 | 0 | 0 | 0 |
| 80.01 - 120.00 | [illegible] | 37,814 | 867,969 | 92,112 | 95,962 |
| 120,01 - 200.00 | 336 | 17,852 | 14,404 | 49,395 | 51,734 |
| 200.01 + | 1,944 | 50,913 | 36,989 | 783,899 | 811,076 |

TABLE B.1 (CONTINUED)

RUMPI

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 4,017 | 9,907 | 6,913 | 13,953 | 49,699 |
| 10.01 - 20.00 | 1,535 | 14,076 | 11,988 | 22,288 | 35,013 |
| 20.01 - 30.00 | 1,014 | 22,825 | 20,878 | 30,359 | 42,000 |
| 30.01 - 40.00 | 595 | 12,769 | 11,507 | 20,504 | 25,186 |
| 40.01 - 50.00 | 595 | 15,749 | 13,839 | 27,495 | 30,839 |
| 50.01 - 60.00 | 177 | 5,668 | 5,237 | 9,686 | 11,059 |
| 60.01 - 80.00 | 428 | 14,565 | 12,523 | 25,911 | 32,305 |
| 80.01 - 120.00 | 363 | 14,299 | 11,217 | 34,830 | 36,286 |
| 120.01 - 200.00 | 363 | 19,286 | 15,584 | 53,361 | 55,891 |
| 200.01 + | 214 | 5,605 | 3,632 | 86,293 | 89,285 |

MZIMBA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 24,985 | 62,016 | 43,526 | 84,010 | 309,472 |
| 10.01 - 20.00 | 12,203 | 111,902 | 95,305 | 177,188 | 278,350 |
| 20.01 - 30.00 | 5,996 | 134,970 | 123,458 | 179,520 | 248,354 |
| 30.01 - 40.00 | 2,998 | 64,337 | 57,981 | 103,311 | 126,905 |
| 40.01 - 50.00 | 1,368 | 36,211 | 31,820 | 63,215 | 70,903 |
| 50.01 - 60.00 | 421 | 13,480 | 12,458 | 23,037 | 26,472 |
| 60.01 - 80.00 | 2,157 | 73,403 | 63,114 | 153,967 | 162,810 |
| 80.01 - 120.00 | 948 | 37,342 | 29,293 | 90,960 | 94,762 |
| 120.01 - 200.00 | 1,262 | 67,050 | 54,178 | 185,527 | 194,310 |
| 200.01 + | 263 | 6,888 | 4,463 | 106,052 | 109,729 |

TABLE B.1 (CONTINUED)

KASUNGU

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 10,379 | 33,764 | 27,539 | 49,615 | 89,412 |
| 10.01 - 20.00 | 7,217 | 70,077 | 57,664 | 119,947 | 156,465 |
| 20.01 - 30.00 | 2,219 | 34,217 | 30,134 | 54,321 | 61,710 |
| 30.01 - 40.00 | 1,913 | 47,194 | 40,996 | 67,184 | 81,762 |
| 40.01 - 50.00 | 1,352 | 37,856 | 32,042 | 60,353 | 66,694 |
| 50.01 - 60.00 | 944 | 36,155 | 29,519 | 49,985 | 63,031 |
| 60.01 - 80.00 | 918 | 49,324 | 43,054 | 63,755 | 68,364 |
| 80.01 - 120.00 | 383 | 23,394 | 20,023 | 39,541 | 42,157 |
| 120.01 - 200.00 | 179 | 13,248 | 10,776 | 28,429 | 31,540 |
| 200.01 + | 0 | 0 | 0 | 0 | 0 |

NKHOTA KOTA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 6,667 | 17,944 | 13,493 | 25,332 | 56,039 |
| 10.01 - 20.00 | 2,002 | 19,439 | 15,996 | 33,273 | 43,403 |
| 20.01 - 30.00 | 2,448 | 37,748 | 33,244 | 59,927 | 68,079 |
| 30.01 - 40.00 | 1,008 | 24,867 | 21,601 | 35,401 | 43,082 |
| 40.01 - 50.00 | 749 | 20,972 | 17,751 | 33,435 | 36,948 |
| 50.01 - 60.00 | 778 | 297,974 | 24,328 | 41,195 | 51,947 |
| 60.01 - 80.00 | 302 | 16,226 | 14,164 | 20,974 | 22,490 |
| 80.01 - 120.00 | 202 | 12,338 | 10,561 | 20,854 | 22,234 |
| 120.01 - 200.00 | 158 | 11,694 | 9,511 | 25,094 | 27,839 |
| 200.01 + | 72 | 8,154 | 6,729 | 30,564 | 31,952 |

TABLE B.1 (CONTINUED)

NTCHISI

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 7,696 | 21,415 | 16,464 | 30,627 | 64,983 |
| 10.01 - 20.00 | 2,926 | 28,411 | 23,379 | 48,630 | 63,436 |
| 20.01 - 30.00 | 1,574 | 24,271 | 21,375 | 38,531 | 43,773 |
| 30.01 - 40.00 | 1,049 | 25,879 | 22,480 | 36,841 | 44,834 |
| 40.01 - 50.00 | 525 | 14,700 | 12,443 | 23,436 | 25,898 |
| 50.01 - 60.00 | 413 | 15,818 | 12,913 | 21,868 | 27,576 |
| 60.01 - 80.00 | 668 | 35,892 | 31,329 | 463,993 | 49,746 |
| 80.01 - 120.00 | 477 | 29,135 | 24,937 | 49,246 | 52,503 |
| 120.01 - 200.00 | 445 | 32,934 | 26,789 | 70,675 | 78,409 |
| 200.01 + | 143 | 16,195 | 13,365 | 60,704 | 63,461 |

DOWA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 11,804 | 34,629 | 27,517 | 50,501 | 100,423 |
| 10.01 - 20.00 | 8,954 | 86,943 | 71,542 | 148,815 | 194,123 |
| 20.01 - 30.00 | 5,291 | 81,587 | 71,852 | 129,524 | 147,143 |
| 30.01 - 40.00 | 3,948 | 97,397 | 84,606 | 138,654 | 168,738 |
| 40.01 - 50.00 | 1,994 | 55,832 | 47,258 | 89,012 | 98,364 |
| 50.01 - 60.00 | 1,425 | 54,578 | 44,560 | 75,454 | 95,147 |
| 60.01 - 80.00 | 2,442 | 131,209 | 114,530 | 169,596 | 181,856 |
| 80.01 - 120.00 | 2,849 | 174,017 | 148,946 | 294,131 | 313,589 |
| 120.01 - 200.00 | 1,180 | 87,332 | 71,036 | 187,408 | 207,916 |
| 200.01 + | 855 | 96,829 | 79,908 | 362,948 | 379,432 |

TABLE B.1 (CONTINUED)

SALIMA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 8,802 | 20,789 | 14,138 | 27,711 | 72,761 |
| 10.01 - 20.00 | 2,862 | 27,790 | 22,867 | 47,566 | 62,048 |
| 20.01 - 30.00 | 2,124 | 32,752 | 28,844 | 51,996 | 59,068 |
| 30.01 - 40.00 | 1,584 | 39,077 | 33,945 | 55,630 | 67,700 |
| 40.01 - 50.00 | 738 | 20,664 | 17,491 | 32,944 | 36,406 |
| 50.01 - 60.00 | 414 | 15,856 | 12,946 | 21,921 | 27,643 |
| 60.01 - 80.00 | 810 | 43,521 | 37,989 | 56,255 | 60,321 |
| 80.01 - 120.00 | 126 | 7,696 | 6,587 | 13,008 | 13,869 |
| 120.01 - 200.00 | 504 | 37,301 | 30,341 | 80,045 | 88,805 |
| 200.01 + | 36 | 4,077 | 3,365 | 15,282 | 15,976 |

LILONGWE

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 27,587 | 84,203 | 68,457 | 124,489 | 236,078 |
| 10.01 - 20.00 | 22,275 | 216,290 | 177,977 | 370,211 | 482,922 |
| 20.01 - 30.00 | 14,073 | 217,006 | 191,111 | 344,507 | 391,370 |
| 30.01 - 40.00 | 11,836 | 291,994 | 253,646 | 415,680 | 505,871 |
| 40.01 - 50.00 | 3,728 | 104,384 | 88,354 | 166,418 | 183,902 |
| 50.01 - 60.00 | 1,584 | 60,667 | 49,532 | 83,873 | 105,764 |
| 60.01 - 80.00 | 4,101 | 220,347 | 192,337 | 284,814 | 305,401 |
| 80.01 - 120.00 | 1,212 | 74,029 | 63,363 | 125,127 | 133,405 |
| 120.01 - 200.00 | 5,499 | 406,981 | 331,039 | 873,351 | 968,924 |
| 200.01 + | 1,305 | 147,791 | 121,965 | 553,973 | 579,133 |

TABLE B.1 (CONTINUED)

MCHINJI

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 6,194 | 16,855 | 12,769 | 23,898 | 52,141 |
| 10.01 - 20.00 | 2,906 | 28,217 | 23,219 | 48,298 | 63,002 |
| 20.01 - 30.00 | 1,340 | 20,663 | 18,197 | 32,803 | 37,265 |
| 30.01 - 40.00 | 1,096 | 27,038 | 23,487 | 38,492 | 46,843 |
| 40.01 - 50.00 | 1,079 | 30,212 | 25,572 | 48,167 | 53,227 |
| 50.01 - 60.00 | 992 | 37,994 | 31,020 | 52,526 | 66,236 |
| 60.01 - 80.00 | 783 | 42,071 | 36,723 | 54,379 | 58,310 |
| 80.01 - 120.00 | 1,027 | 62,729 | 53,692 | 106,028 | 113,042 |
| 120.01 - 200.00 | 1,322 | 97,841 | 79,584 | 209,960 | 232,936 |
| 200.01 + | 696 | 78,822 | 65,048 | 205,452 | 308,871 |

DEDZA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 27,270 | 76,127 | 58,606 | 108,943 | 230,353 |
| 10.01 - 20.00 | 13,716 | 133,182 | 109,591 | 227,960 | 297,363 |
| 20.01 - 30.00 | 5,508 | 84,933 | 74,799 | 134,836 | 153,178 |
| 30.01 - 40.00 | 1,620 | 39,965 | 34,717 | 56,894 | 69,239 |
| 40.01 - 50.00 | 1,404 | 39,312 | 33,275 | 62,675 | 69,259 |
| 50.01 - 60.00 | 918 | 35,159 | 28,706 | 48,608 | 61,295 |
| 60.01 - 80.00 | 1,620 | 87,043 | 75,978 | 112,509 | 120,641 |
| 80.01 - 120.00 | 432 | 26,387 | 22,585 | 44,599 | 47,550 |
| 120.01 - 200.00 | 1,134 | 83,927 | 68,267 | 180,102 | 199,810 |
| 200.01 + | 324 | 36,693 | 30,281 | 137,538 | 143,785 |

TABLE B.1 (CONTINUED)

NCHEU

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 20,337 | 7,342 | 44,234 | 82,065 | 171,963 |
| 10.01 - 20.00 | 7,220 | 70,106 | 57,688 | 119,996 | 156,530 |
| 20.01 - 30.00 | 2,419 | 37,301 | 32,850 | 59,217 | 67,272 |
| 30.01 - 40.00 | 1,663 | 41,026 | 35,638 | 58,405 | 71,077 |
| 40.01 - 50.00 | 1,399 | 39,172 | 33,156 | 62,451 | 69,013 |
| 50.01 - 60.00 | 869 | 33,283 | 27,174 | 46,014 | 58,023 |
| 60.01 - 80.00 | 1,701 | 91,395 | 79,777 | 118,134 | 126,673 |
| 80.01 - 120.00 | 454 | 27,730 | 23,735 | 46,871 | 49,972 |
| 120.01 - 200.00 | 756 | 55,952 | 45,511 | 120,068 | 133,207 |
| 200.01 + | 983 | 111,325 | 91,871 | 417,284 | 436,236 |

MANGOCHI

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 32,112 | 64,855 | 8,143 | 78,241 | 314,348 |
| 10.01 - 20.00 | 6,799 | 52,080 | 40,862 | 101,985 | 143,119 |
| 20.01 - 30.00 | 3,818 | 44,442 | 31,613 | 95,374 | 112,707 |
| 30.01 - 40.00 | 2,929 | 43,876 | 34,181 | 115,695 | 128,232 |
| 40.01 - 50.00 | 2,406 | 30,917 | 21,101 | 108,078 | 115,392 |
| 50.01 - 60.00 | 837 | 14,514 | 9,525 | 45,315 | 60,691 |
| 60.01 - 80.00 | 1,046 | 14,895 | 7,343 | 72,519 | 75,919 |
| 80.01 - 120.00 | 2,197 | 61,055 | 37,986 | 215,438 | 226,071 |
| 120.01 - 200.00 | 157 | 5,617 | 3,661 | 23,332 | 23,737 |
| 200.01 + | 0 | 0 | 0 | 0 | 0 |

TABLE B.1 (CONTINUED)

KASUPE

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 22,792 | 52,835 | 25,737 | 85,651 | 216,718 |
| 10.01 - 20.00 | 12,037 | 92,203 | 72,342 | 180,555 | 253,378 |
| 20.01 - 30.00 | 8,239 | 95,902 | 68,219 | 205,810 | 243,215 |
| 30.01 - 40.00 | 1,338 | 20,043 | 15,614 | 52,581 | 58,578 |
| 40.01 - 50.00 | 1,498 | 19,249 | 13,137 | 67,290 | 71,844 |
| 50.01 - 60.00 | 1,605 | 27,831 | 18,265 | 86,895 | 116,379 |
| 60.01 - 80.00 | 2,782 | 39,616 | 19,530 | 192,876 | 201,918 |
| 80.01 - 120.00 | 803 | 22,315 | 13,884 | 78,742 | 82,629 |
| 120.01 - 200.00 | 642 | 22,971 | 14,971 | 95,408 | 97,064 |
| 200.01 + | 1,766 | 57,148 | -3,055 | 645,508 | 658,789 |

ZOMBA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 24,900 | 55,656 | 22,058 | 84,428 | 238,705 |
| 10.01 - 20.00 | 7,916 | 60,637 | 47,575 | 118,740 | 166,632 |
| 20.01 - 30.00 | 3,407 | 39,658 | 28,210 | 85,107 | 100,575 |
| 30.01 - 40.00 | 4,058 | 60,789 | 47,357 | 160,291 | 177,659 |
| 40.01 - 50.00 | 1,052 | 13,518 | 9,226 | 47,256 | 50,454 |
| 50.01 - 60.00 | 1,303 | 22,594 | 14,828 | 70,544 | 94,481 |
| 60.01 - 80.00 | 3,056 | 43,517 | 21,453 | 211,872 | 221,805 |
| 80.01 - 120.00 | 2,004 | 55,691 | 34,649 | 196,512 | 206,212 |
| 120.01 - 200.00 | 752 | 26,907 | 17,537 | 111,755 | 113,695 |
| 200.01 + | 1,653 | 53,491 | -2,860 | 604,205 | 616,635 |

TABLE B.1 (CONTINUED)

CHIRADZULU

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 12,163 | 28,777 | 15,442 | 48,284 | 115,106 |
| 10.01 - 20.00 | 5,813 | 44,528 | 34,936 | 87,195 | 122,364 |
| 20.01 - 30.00 | 2,890 | 33,640 | 23,929 | 72,192 | 85,313 |
| 30.01 - 40.00 | 3,091 | 46,303 | 36,072 | 122,095 | 135,324 |
| 40.01 - 50.00 | 4,066 | 52,248 | 35,659 | 182,645 | 195,005 |
| 50.01 - 60.00 | 638 | 11,063 | 7,260 | 34,541 | 46,261 |
| 60.01 - 80.00 | 1,882 | 26,800 | 13,212 | 130,479 | 136,596 |
| 80.01 - 120.00 | 840 | 23,344 | 14,524 | 82,370 | 86,436 |
| 120.01 - 200.00 | 1,445 | 51,702 | 33,697 | 214,742 | 218,469 |
| 200.01 + | 773 | 25,014 | -1,337 | 282,547 | 288,360 |

BLANTYRE

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 13,874 | 31,267 | 13,041 | 48,174 | 132,764 |
| 10.01 - 20.00 | 9,609 | 73,605 | 57,750 | 144,135 | 202,270 |
| 20.01 - 30.00 | 4,715 | 54,883 | 39,040 | 117,781 | 139,187 |
| 30.01 - 40.00 | 1,616 | 24,208 | 18,858 | 63,832 | 70,749 |
| 40.01 - 50.00 | 2,739 | 35,196 | 24,021 | 123,036 | 131,362 |
| 50.01 - 60.00 | 1,392 | 24,137 | 15,841 | 75,363 | 100,934 |
| 60.01 - 80.00 | 3,637 | 51,791 | 25,532 | 252,153 | 263,973 |
| 80.01 - 120.00 | 2,021 | 56,164 | 34,943 | 198,179 | 207,961 |
| 120.01 - 200.00 | 2,245 | 80,326 | 52,353 | 333,630 | 339,422 |
| 200.01 + | 3,143 | 101,708 | -5,437 | 1,148,829 | 1,172,465 |

TABLE B.1 (CONTINUED)

THYOLO

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 23,964 | 51,695 | 15,745 | 72,980 | 231,488 |
| 10.01 - 20.00 | 9,674 | 74,103 | 58,141 | 145,110 | 203,638 |
| 20.01 - 30.00 | 4,893 | 56,955 | 40,514 | 122,227 | 144,441 |
| 30.01 - 40.00 | 2,224 | 33,316 | 25,954 | 87,848 | 97,367 |
| 40.01 - 50.00 | 2,669 | 34,297 | 23,407 | 119,892 | 128,005 |
| 50.01 - 60.00 | 2,057 | 35,668 | 23,409 | 111,366 | 149,153 |
| 60.01 - 80.00 | 2,669 | 38,007 | 18,736 | 185,042 | 192,716 |
| 80.01 - 120.00 | 3,058 | 84,982 | 52,873 | 316,244 | 314,668 |
| 120.01 - 200.00 | 3,225 | 115,391 | 75,207 | 47,927 | 487,588 |
| 200.01 + | 1,112 | 35,984 | -1,924 | 406,458 | 414,821 |

MULANJE

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 46,980 | 102,059 | 32,962 | 146,232 | 453,149 |
| 10.01 - 20.00 | 15,934 | 122,054 | 95,763 | 239,010 | 335,411 |
| 20.01 - 30.00 | 7,813 | 90,943 | 64,692 | 195,169 | 230,640 |
| 30.01 - 40.00 | 5,448 | 81,611 | 63,578 | 215,196 | 238,513 |
| 40.01 - 50.00 | 1,439 | 18,491 | 12,620 | 64,640 | 69,014 |
| 50.01 - 60.00 | 5,757 | 99,826 | 65,515 | 311,684 | 417,440 |
| 60.01 - 80.00 | 9,972 | 142,001 | 70,003 | 691,359 | 723,768 |
| 80.01 - 120.00 | 6,168 | 171,409 | 106,645 | 604,834 | 634,687 |
| 120.01 - 200.00 | 1,850 | 66,193 | 43,142 | 274,929 | 27,902 |
| 200.01 + | 1,439 | 46,566 | -2,489 | 525,983 | 536,805 |

TABLE B.1 (CONTINUED)

CHIKWAWA

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 9,723 | 22,649 | 11,301 | 37,023 | 92,348 |
| 10.01 - 20.00 | 7,359 | 56,369 | 44,228 | 110,385 | 154,907 |
| 20.01 - 30.00 | 4,129 | 48,062 | 34,188 | 103,142 | 121,888 |
| 30.01 - 40.00 | 2,264 | 33,915 | 26,421 | 89,428 | 99,118 |
| 40.01 - 50.00 | 1,532 | 19,686 | 13,436 | 68,817 | 73,475 |
| 50.01 - 60.00 | 1,765 | 30,605 | 20,086 | 95,557 | 127,980 |
| 60.01 - 80.00 | 1,099 | 15,650 | 7,715 | 76,194 | 79,765 |
| 80.01 - 120.00 | 1,832 | 50,911 | 31,675 | 179,646 | 188,513 |
| 120.01 - 200.00 | 1,898 | 67,910 | 44,261 | 282,062 | 286,959 |
| 200.01 + | 1,732 | 56,048 | -2,996 | 633,081 | 646,105 |

NSANJE

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 10,832 | 25,123 | 12,268 | 40,759 | 102,985 |
| 10.01 - 20.00 | 3,984 | 30,517 | 23,944 | 59,760 | 83,913 |
| 20.01 - 30.00 | 3,337 | 38,843 | 27,630 | 83,358 | 98,508 |
| 30.01 - 40.00 | 1,345 | 20,148 | 15,696 | 53,128 | 58,884 |
| 40.01 - 50.00 | 971 | 12,477 | 8,516 | 43,617 | 46,569 |
| 50.01 - 60.00 | 398 | 3,433 | 4,529 | 21,548 | 28,859 |
| 60.01 - 80.00 | 1,818 | 25,888 | 12,762 | 126,042 | 131,950 |
| 80.01 - 120.00 | 647 | 17,980 | 11,187 | 63,445 | 66,576 |
| 120.01 - 200.00 | 647 | 23,150 | 15,088 | 96,151 | 97,820 |
| 200.01 + | 971 | 31,422 | -1,680 | 354,920 | 362,222 |

TABLE B.1 (CONTINUED)

KARONGA RURAL DEVELOPMENT PROJECT (PART OF)

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 924 | 2,071 | 1,314 | 2,600 | 11,247 |
| 10.01 - 20.00 | 630 | 5,777 | 4,920 | 9,147 | 14,370 |
| 20.01 - 30.00 | 671 | 15,126 | 13,836 | 20,119 | 27,834 |
| 30.01 - 40.00 | 251 | 5,407 | 4,873 | 8,683 | 10,667 |
| 40.01 - 50.00 | 378 | 10,005 | 8,792 | 17,467 | 19,591 |
| 50.01 - 60.00 | 84 | 2,689 | 2,485 | 4,596 | 5,248 |
| 60.01 - 80.00 | 294 | 10,004 | 8,602 | 20,985 | 22,191 |
| 80.01 - 120.00 | 336 | 13,235 | 10,382 | 32,239 | 33,586 |
| 120.01 - 200.00 | 294 | 15,620 | 12,621 | 43,220 | 45,267 |
| 200.01 + | 336 | 8,799 | 5,701 | 135,488 | 140,185 |

LILONGWE LAND DEVELOPMENT PROGRAM (PART OF)

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 2,385 | 8,085 | 6,940 | 12,354 | 20,749 |
| 10.01 - 20.00 | 2,304 | 22,371 | 18,408 | 38,292 | 49,950 |
| 20.01 - 30.00 | 2,546 | 39,259 | 34,574 | 62,326 | 70,804 |
| 30.01 - 40.00 | 1,313 | 32,391 | 28,137 | 46,112 | 56,117 |
| 40.01 - 50.00 | 1,648 | 46,144 | 39,057 | 73,566 | 81,295 |
| 50.01 - 60.00 | 495 | 18,958 | 15,478 | 26,210 | 33,051 |
| 60.01 - 80.00 | 991 | 53,246 | 46,477 | 68,824 | 73,799 |
| 80.01 - 120.00 | 1,232 | 75,250 | 64,408 | 127,191 | 135,606 |
| 120.01 - 200.00 | 241 | 17,836 | 14,508 | 38,275 | 42,464 |
| 200.01 + | 241 | 27,293 | 22,523 | 102,304 | 106,950 |

TABLE B.1 (CONTINUED)

CENTRAL REGION LAKESHORE DEVELOPMENT PROJECT (PART OF)

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 5,518 | 12,754 | 8,509 | 16,825 | 45,500 |
| 10.01 - 20.00 | 1,041 | 10,108 | 8,317 | 17,301 | 22,568 |
| 20.01 - 30.00 | 520 | 8,018 | 7,061 | 12,729 | 14,461 |
| 30.01 - 40.00 | 352 | 8,683 | 7,543 | 12,362 | 15,044 |
| 40.01 - 50.00 | 176 | 4,928 | 4,171 | 7,856 | 8,682 |
| 50.01 - 60.00 | 0 | 0 | 0 | 0 | 00 |
| 60.01 - 80.00 | 352 | 18,912 | 16,508 | 24,446 | 26,213 |
| 80.01 - 120.00 | 84 | 5,130 | 4,391 | 8,672 | 9,245 |
| 120.01 - 200.00 | 352 | 26,051 | 21,190 | 55,904 | 62,022 |
| 200.01 + | 0 | 0 | 0 | 0 | 0 |

LOWER SHIRE VALLEY DEVELOPMENT PROJECT (PART OF)

| Economic Class | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 0.00 - 10.00 | 1,404 | 3,369 | 1,930 | 5,793 | 19,022 |
| 10.01 - 20.00 | 1,267 | 9,705 | 7,614 | 19,005 | 26,670 |
| 20.01 - 30.00 | 1,267 | 14,747 | 10,490 | 31,649 | 37,401 |
| 30.01 - 40.00 | 669 | 10,021 | 7,807 | 26,425 | 29,288 |
| 40.01 - 50.00 | 331 | 4,253 | 2,902 | 14,868 | 15,874 |
| 50.01 - 60.00 | 331 | 5,739 | 3,766 | 17,920 | 24,000 |
| 60.01 - 80.00 | 741 | 10,551 | 5,201 | 51,373 | 53,781 |
| 80.01 - 120.00 | 532 | 14,784 | 9,198 | 52,167 | 54,742 |
| 120.01 - 200.00 | 201 | 7,191 | 4,687 | 29,870 | 30,389 |
| 200.01 + | 460 | 14,885 | -795 | 168,139 | 171,598 |

TABLE B.2

CUMULATIVE PERCENTAGE DISTRIBUTION OF INCOME AND HOUSEHOLDS BY DEFINITION OF INCOME AND BY ECONOMIC CLASSES RANKED FROM LOWEST TO HIGHEST INCOME CLASS

MALAWI

| Ranked Economic Classes | Households (H) | Gross Farm Cash Income (G) | Net Farm Cash Income (N) | Net Farm Cash Income Plus Off-Farm Cash Income ($N_W$) | Net Farm Cash Income Plus Off-Farm Cash Income Plus Cash Transfers ($N_T$) |
|---|---|---|---|---|---|
| 1 | 42.56 | 8.26 | 6.36 | 4.49 | 10.27 |
| 2 | 61.84 | 21.53 | 20.90 | 13.43 | 20.68 |
| 3 | 72.43 | 33.81 | 34.62 | 21.45 | 28.79 |
| 4 | 79.02 | 44.32 | 46.63 | 28.67 | 35.92 |
| 5 | 83.02 | 50.66 | 53.46 | 34.02 | 40.83 |
| 6 | 85.91 | 56.41 | 59.36 | 38.65 | 45.91 |
| 7 | 91.11 | 67.78 | 70.92 | 49.39 | 55.48 |
| 8 | 94.61 | 78.02 | 81.09 | 59.68 | 64.62 |
| 9 | 97.70 | 91.12 | 94.59 | 73.73 | 77.79 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

NORTHERN REGION

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 45.29 | 8.26 | 6.71 | 4.19 | 12.98 |
| 2 | 63.73 | 21.13 | 19.81 | 12.01 | 22.77 |
| 3 | 74.95 | 40.35 | 40.82 | 21.83 | 33.59 |
| 4 | 81.76 | 51.48 | 52.80 | 28.69 | 40.31 |
| 5 | 85.67 | 59.35 | 61.06 | 33.96 | 45.03 |
| 6 | 87.17 | 63.01 | 65.11 | 36.37 | 47.21 |
| 7 | 90.78 | 72.35 | 74.71 | 43.89 | 53.55 |
| 8 | 94.29 | 82.87 | 81.56 | 53.72 | 61.72 |
| 9 | 97.09 | 94.21 | 95.52 | 65.77 | 71.77 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

CENTRAL REGION

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 40.00 | 6.70 | 6.24 | 5.33 | 9.24 |
| 2 | 62.10 | 19.27 | 18.53 | 17.16 | 22.30 |
| 3 | 73.80 | 29.84 | 29.[illegible] | 26.39 | 31.16 |
| 4 | 81.90 | 41.54 | [illegible] | 35.56 | 40.60 |
| 5 | 86.[illegible] | 48.2[illegible] | [illegible] | 41.45 | 46.11 |
| 6 | 88.[illegible] | 54.1 | [illegible] | 45.89 | 50.84 |
| 7 | [illegible] | 6[illegible].3 | [illegible] | 55.29 | 59.36 |
| 8 | 95.[illegible] | 75.54 | [illegible] | 62.94 | 66.26 |
| 9 | 98.60 | 90.71 | [illegible] | 80.85 | 83.07 |
| 10 | 100.00 | 100.00 | [illegible] | 00.00 | 100.00 |

TABLE B.2 (CONTINUED)

SOUTHERN REGION

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 43.66 | 10.28 | 6.41 | 4.01 | 10.14 |
| 2 | 61.14 | 24.59 | 25.87 | 11.41 | 19.03 |
| 3 | 70.73 | 36.51 | 40.57 | 18.17 | 25.87 |
| 4 | 76.12 | 45.15 | 52.23 | 24.18 | 31.57 |
| 5 | 80.22 | 50.77 | 58.88 | 29.37 | 36.31 |
| 6 | 83.72 | 57.25 | 66.25 | 34.71 | 42.44 |
| 7 | 89.91 | 66.20 | 74.30 | 46.83 | 53.29 |
| 8 | 94.31 | 79.25 | 88.38 | 59.00 | 64.22 |
| 9 | 97.20 | 90.33 | 100.89 | 71.15 | 74.80 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

CHITIPA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 41.90 | 7.27 | 5.98 | 3.84 | 11.78 |
| 2 | 61.70 | 20.23 | 19.15 | 11.97 | 22.06 |
| 3 | 72.40 | 37.42 | 37.91 | 21.02 | 32.15 |
| 4 | 78.40 | 46.61 | 47.79 | 26.86 | 37.93 |
| 5 | 82.60 | 54.54 | 56.11 | 32.35 | 42.89 |
| 6 | 85.60 | 61.40 | 63.67 | 36.99 | 47.16 |
| 7 | 89.20 | 70.13 | 72.64 | 44.24 | 53.34 |
| 8 | 95.20 | 87.00 | 88.43 | 60.51 | 66.99 |
| 9 | 97.30 | 94.95 | 96.10 | 69.22 | 74.34 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

KARONGA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 21.52 | 1.56 | 2.30 | 1.44 | 4.47 |
| 2 | 41.54 | 10.98 | 11.67 | 7.09 | 12.12 |
| 3 | 57.26 | 29.14 | 31.06 | 16.25 | 23.02 |
| 4 | 68.57 | 41.60 | 44.17 | 23.83 | 31.04 |
| 5 | 74.38 | 49.48 | 52.25 | 29.04 | 36.07 |
| 6 | 77.18 | 54.08 | 57.22 | 32.02 | 39.00 |
| 7 | 84.29 | 66.50 | 69.68 | 41.89 | 47.99 |
| 8 | 90.09 | 78.23 | 80.43 | 52.72 | 57.70 |
| 9 | 96.20 | 94.89 | 96.13 | 70.19 | 73.44 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

NKHATA BAY

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 59.44 | 11.68 | 1.84 | 3.31 | 12.46 |
| 2 | 66.23 | 17.27 | 3.05 | 5.34 | 15.14 |
| 3 | 74.33 | 33.61 | 6.86 | 10.34 | 20.94 |
| 4 | 81.12 | 46.69 | 9.86 | 15.17 | 25.91 |
| 5 | 85.11 | 56.18 | 11.99 | 18.97 | 29.49 |
| 6 | 86.51 | 60.20 | 12.93 | 20.55 | 31.00 |
| 7 | 86.51 | 60.20 | 12.93 | 20.55 | 31.00 |
| 8 | 90.51 | 74.32 | 95.49 | 28.48 | 37.91 |
| 9 | 91.91 | 80.99 | 96.86 | 32.70 | 41.63 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

RUMPI

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 43.19 | 7.35 | 6.10 | 4.30 | 12.19 |
| 2 | 59.69 | 17.80 | 16.68 | 11.16 | 20.79 |
| 3 | 70.5[illegible] | 34.74 | 35.10 | 20.51 | 31.09 |
| 4 | 76.99 | 44.21 | 45.26 | 26.83 | 37.27 |
| 5 | 83.39 | 55.90 | 57.47 | 35.30 | 44.84 |
| 6 | 85.29 | 60.11 | 62.09 | 38.28 | 47.53 |
| 7 | 89.89 | 70.92 | 73.14 | 46.26 | 55.48 |
| 8 | 93.80 | 81.53 | 83.04 | 56.99 | 64.38 |
| 9 | 97.70 | 95.84 | 96.79 | 73.42 | 78.09 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

MZIMBA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 47.50 | 10.21 | 8.44 | 7.20 | 19.08 |
| 2 | 70.70 | 28.62 | 26.93 | 22.39 | 36.24 |
| 3 | 82.10 | 50.84 | 50.87 | 37.77 | 51.55 |
| 4 | 87.80 | 61.43 | 62.12 | 46.63 | 59.37 |
| 5 | 90.40 | 67.39 | 68.29 | 52.04 | 63.74 |
| 6 | 91.20 | 69.60 | 70.70 | 54.02 | 65.38 |
| 7 | 95.30 | 81.69 | 82.95 | 67.21 | 75.41 |
| 8 | 97.10 | 87.83 | 88.63 | 75.01 | 81.26 |
| 9 | 99.50 | 98.87 | 99.13 | 90.91 | 93.24 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

KASUNGU

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 40.70 | 9.78 | 9.44 | 9.31 | 13.52 |
| 2 | 68.99 | 30.08 | 29.20 | 31.81 | 37.19 |
| 3 | 77.69 | 39.99 | 39.53 | 41.99 | 46.52 |
| 4 | 85.19 | 53.66 | 53.59 | 54.60 | 58.89 |
| 5 | 90.50 | 64.63 | 64.57 | 65.92 | 68.98 |
| 6 | 94.20 | 75.10 | 74.69 | 75.29 | 78.51 |
| 7 | 97.80 | 89.39 | 89.44 | 87.25 | 88.85 |
| 8 | 99.30 | 96.16 | 96.31 | 94.67 | 95.23 |
| 9 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

NKHOTA KOTA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 46.34 | 3.84 | 8.06 | 7.77 | 13.87 |
| 2 | 60.26 | 8.00 | 17.62 | 17.97 | 24.61 |
| 3 | 77.28 | 16.08 | 37.48 | 36.35 | 41.46 |
| 4 | 84.28 | 21.40 | 50.39 | 47.21 | 52.13 |
| 5 | 89.49 | 25.88 | 60.99 | 57.47 | 61.27 |
| 6 | 94.90 | 89.64 | 75.53 | 70.10 | 74.13 |
| 7 | 97.00 | 93.11 | 83.99 | 76.53 | 79.70 |
| 8 | 98.40 | 95.75 | 90.30 | 82.93 | 85.20 |
| 9 | 99.50 | 98.26 | 95.98 | 90.63 | 92.09 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

NTCHISI

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 48.35 | 8.75 | 8.01 | 3.63 | 12.63 |
| 2 | 66.74 | 20.37 | 19.39 | 9.38 | 24.95 |
| 3 | 76.63 | 30.29 | 29.79 | 13.95 | 33.46 |
| 4 | 83.22 | 40.86 | 40.73 | 18.31 | 42.17 |
| 5 | 86.52 | 46.87 | 46.79 | 21.08 | 47.20 |
| 6 | 89.11 | 53.34 | 53.07 | 23.67 | 52.56 |
| 7 | 93.31 | 68.01 | 68.32 | 78.61 | 62.23 |
| 8 | 96.31 | 79.92 | 80.46 | 84.44 | 72.43 |
| 9 | 99.10 | 93.38 | 93.50 | 92.81 | 87.67 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

DOWA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 28.97 | 3.85 | 3.61 | 3.07 | 5.32 |
| 2 | 50.95 | 13.50 | 13.00 | 12.11 | 15.61 |
| 3 | 63.94 | 22.56 | 22.44 | 19.98 | 23.41 |
| 4 | 73.63 | 33.38 | 33.54 | 28.40 | 32.35 |
| 5 | 78.52 | 39.58 | 39.75 | 33.81 | 37.57 |
| 6 | 82.02 | 45.64 | 45.60 | 38.39 | 42.61 |
| 7 | 88.01 | 60.22 | 60.63 | 48.70 | 52.25 |
| 8 | 95.01 | 79.55 | 80.18 | 66.56 | 68.87 |
| 9 | 97.90 | 89.25 | 89.51 | 77.95 | 79.89 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

SALIMA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 48.90 | 8.33 | 6.78 | 6.89 | 14.42 |
| 2 | 64.80 | 19.47 | 17.75 | 18.71 | 26.72 |
| 3 | 76.60 | 32.59 | 31.58 | 31.63 | 38.42 |
| 4 | 85.40 | 48.26 | 47.86 | 45.46 | 51.84 |
| 5 | 89.50 | 56.54 | 56.25 | 53.65 | 59.05 |
| 6 | 91.80 | 62.89 | 62.46 | 59.09 | 64.53 |
| 7 | 96.30 | 80.33 | 80.68 | 73.07 | 76.49 |
| 8 | 97.00 | 83.42 | 83.83 | 76.31 | 79.23 |
| 9 | 99.80 | 98.37 | 98.39 | 96.20 | 96.83 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

LILONGWE

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 29.60 | 4.62 | 4.45 | 3.72 | 6.06 |
| 2 | 53.50 | 16.48 | 16.03 | 14.80 | 18.47 |
| 3 | 68.60 | 28.38 | 28.45 | 25.11 | 28.52 |
| 4 | 81.30 | 44.39 | 44.95 | 37.54 | 41.52 |
| 5 | 95.30 | 50.11 | 50.69 | 42.52 | 46.24 |
| 6 | 87.00 | 53.44 | 53.91 | 45.03 | 48.96 |
| 7 | 91.40 | 65.52 | 66.42 | 53.55 | 56.81 |
| 8 | 92.70 | 69.58 | 70.54 | 57.30 | 60.23 |
| 9 | 98.60 | 91.90 | 92.07 | 83.43 | 85.12 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

MCHINJI

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 35.53 | 3.81 | 3.46 | 2.91 | 5.05 |
| 2 | 52.19 | 10.19 | 9.74 | 8.80 | 11.16 |
| 3 | 59.88 | 14.86 | 14.67 | 12.80 | 14.77 |
| 4 | 66.17 | 20.97 | 21.03 | 17.50 | 19.31 |
| 5 | 72.35 | 27.80 | 27.96 | 23.37 | 24.47 |
| 6 | 78.04 | 36.38 | 36.36 | 29.78 | 30.89 |
| 7 | 82.54 | 45.89 | 46.30 | 36.41 | 36.54 |
| 8 | 88.43 | 60.07 | 60.84 | 49.34 | 47.49 |
| 9 | 96.01 | 82.18 | 82.39 | 74.94 | 70.07 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

DEDZA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 50.55 | 11.84 | 10.92 | 9.77 | 16.54 |
| 2 | 75.98 | 32.59 | 31.33 | 30.22 | 37.90 |
| 3 | 86.19 | 45.78 | 45.27 | 42.32 | 48.90 |
| 4 | 89.19 | 52.00 | 51.73 | 47.43 | 53.87 |
| 5 | 91.79 | 58.11 | 57.93 | 53.05 | 58.84 |
| 6 | 93.49 | 63.58 | 63.28 | 57.41 | 63.25 |
| 7 | 96.50 | 77.13 | 77.43 | 67.50 | 71.91 |
| 8 | 97.30 | 81.23 | 81.64 | 71.50 | 75.32 |
| 9 | 99.40 | 94.29 | 94.36 | 87.66 | 89.67 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

NCHEU

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 53.80 | 1.43 | 9.38 | 7.26 | 12.83 |
| 2 | 72.90 | 15.05 | 21.61 | 17.87 | 24.52 |
| 3 | 79.30 | 22.30 | 28.58 | 23.11 | 29.54 |
| 4 | 83.70 | 30.27 | 36.13 | 28.28 | 34.84 |
| 5 | 87.40 | 37.88 | 43.16 | 33.80 | 39.99 |
| 6 | 89.70 | 44.35 | 48.92 | 37.87 | 44.32 |
| 7 | 94.20 | 62.11 | 65.84 | 48.32 | 53.77 |
| 8 | 95.40 | 67.50 | 70.87 | 52.47 | 57.50 |
| 9 | 97.40 | 78.37 | 80.52 | 63.09 | 67.44 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

MANGOCHI

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 61.40 | 19.52 | 4.19 | 9.14 | 26.19 |
| 2 | 74.40 | 35.19 | 25.21 | 21.06 | 38.12 |
| 3 | 81.70 | 48.57 | 41.47 | 32.20 | 47.51 |
| 4 | 87.30 | 61.78 | 59.05 | 45.71 | 58.19 |
| 5 | 91.90 | 71.08 | 69.90 | 58.34 | 67.80 |
| 6 | 93.50 | 75.45 | 74.80 | 63.63 | 72.86 |
| 7 | 95.50 | 79.93 | 78.58 | 72.11 | 79.19 |
| 8 | 99.70 | 98.31 | 98.12 | 97.27 | 98.02 |
| 9 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

KASUPE

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 42.60 | 11.74 | 9.95 | 5.06 | 10.83 |
| 2 | 65.10 | 32.22 | 37.92 | 15.74 | 23.50 |
| 3 | 80.50 | 53.53 | 64.29 | 27.91 | 35.66 |
| 4 | 83.00 | 57.98 | 70.33 | 31.02 | 38.58 |
| 5 | 85.80 | 62.26 | 75.41 | 35.00 | 42.18 |
| 6 | 88.80 | 68.44 | 82.47 | 40.13 | 47.99 |
| 7 | 94.00 | 77.24 | 90.02 | 51.54 | 58.09 |
| 8 | 95.50 | 82.20 | 95.39 | 56.19 | 62.22 |
| 9 | 96.70 | 87.30 | 101.18 | 61.83 | 67.07 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

ZOMBA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 49.70 | 12.87 | 9.18 | 4.99 | 12.01 |
| 2 | 65.50 | 26.89 | 29.00 | 12.02 | 20.40 |
| 3 | 72.30 | 36.06 | 40.76 | 17.05 | 25.46 |
| 4 | 80.40 | 50.12 | 60.49 | 26.53 | 34.40 |
| 5 | 82.50 | 53.24 | 64.33 | 29.33 | 36.94 |
| 6 | 85.10 | 58.47 | 70.51 | 33.50 | 41.70 |
| 7 | 91.20 | 68.53 | 79.45 | 46.03 | 52.86 |
| 8 | 95.20 | 81.41 | 93.88 | 57.65 | 63.24 |
| 9 | 96.70 | 87.63 | 101.19 | 64.26 | 68.96 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

CHIRADZULU

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 36.20 | 8.38 | 7.27 | 3.84 | 8.05 |
| 2 | 53.50 | 21.35 | 23.60 | 10.78 | 16.62 |
| 3 | 62.10 | 31.14 | 34.82 | 16.52 | 22.58 |
| 4 | 71.30 | 44.62 | 51.72 | 26.23 | 32.05 |
| 5 | 83.40 | 59.84 | 68.43 | 40.76 | 45.70 |
| 6 | 85.30 | 63.06 | 71.83 | 43.51 | 48.93 |
| 7 | 90.90 | 70.86 | 78.02 | 53.89 | 58.49 |
| 8 | 93.40 | 77.66 | 84.83 | 60.44 | 64.54 |
| 9 | 97.70 | 92.72 | 100.62 | 77.52 | 79.82 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

BLANTYRE

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 30.84 | 5.86 | 4.93 | 1.92 | 4.81 |
| 2 | 52.19 | 19.67 | 22.35 | 7.68 | 12.13 |
| 3 | 62.67 | 29.96 | 37.12 | 12.38 | 17.18 |
| 4 | 66.27 | 34.50 | 44.26 | 14.93 | 19.74 |
| 5 | 72.35 | 41.10 | 53.35 | 19.84 | 24.50 |
| 6 | 75.45 | 45.62 | 59.35 | 22.85 | 28.15 |
| 7 | 83.53 | 55.33 | 69.01 | 32.91 | 37.71 |
| 8 | 88.02 | 65.87 | 82.24 | 40.82 | 45.24 |
| 9 | 93.01 | 80.93 | 102.05 | 54.14 | 57.54 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

THYOLO

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 43.14 | 9.22 | 4.74 | 4.52 | 9.79 |
| 2 | 60.56 | 22.45 | 22.25 | 13.50 | 18.40 |
| 3 | 69.37 | 32.61 | 34.45 | 21.07 | 24.51 |
| 4 | 73.37 | 38.56 | 42.26 | 26.51 | 28.62 |
| 5 | 78.18 | 44.68 | 49.31 | 33.93 | 34.04 |
| 6 | 81.88 | 51.04 | 56.36 | 40.83 | 40.34 |
| 7 | 86.69 | 57.82 | 62.00 | 52.29 | 48.54 |
| 8 | 92.19 | 72.99 | 77.93 | 71.87 | 61.84 |
| 9 | 98.00 | 93.58 | 100.57 | 74.83 | 82.46 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

MULANJE

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 45.70 | 10.84 | 5.96 | 4.47 | 12.36 |
| 2 | 61.20 | 23.81 | 23.30 | 11.78 | 21.50 |
| 3 | 68.80 | 33.48 | 35.01 | 17.75 | 27.79 |
| 4 | 74.10 | 42.15 | 46.52 | 24.34 | 34.30 |
| 5 | 75.50 | 44.11 | 48.80 | 26.32 | 36.18 |
| 6 | 81.10 | 54.72 | 60.66 | 35.85 | 47.56 |
| 7 | 90.80 | 69.81 | 73.33 | 57.00 | 67.30 |
| 8 | 96.80 | 88.02 | 92.64 | 75.50 | 84.60 |
| 9 | 98.60 | 95.05 | 100.45 | 83.91 | 85.36 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

CHIKWAWA

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 29.17 | 5.64 | 4.90 | 2.21 | 4.94 |
| 2 | 51.25 | 19.67 | 24.11 | 8.80 | 13.21 |
| 3 | 63.63 | 31.63 | 38.95 | 14.96 | 19.73 |
| 4 | 70.43 | 40.07 | 50.42 | 20.29 | 25.03 |
| 5 | 75.02 | 44.97 | 56.25 | 24.40 | 28.95 |
| 6 | 80.32 | 52.58 | 64.98 | 30.10 | 35.79 |
| 7 | 83.61 | 56.48 | 68.33 | 34.65 | 40.06 |
| 8 | 89.11 | 69.15 | 82.08 | 45.38 | 50.13 |
| 9 | 94.80 | 86.05 | 101.30 | 62.21 | 65.47 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

NSANJE

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 43.41 | 10.97 | 9.44 | 4.32 | 9.55 |
| 2 | 59.38 | 24.30 | 27.86 | 10.66 | 17.33 |
| 3 | 72.76 | 41.26 | 49.13 | 19.50 | 26.47 |
| 4 | 78.15 | 50.06 | 61.21 | 25.14 | 3[illegible].93 |
| 5 | 82.04 | 55.51 | 67.76 | 29.77 | 36.25 |
| 6 | 83.64 | 57.01 | 71.25 | 32.05 | 38.92 |
| 7 | 90.92 | 68.32 | 81.07 | 45.42 | 5[illegible].16 |
| 8 | 93.52 | 76.17 | 89.68 | 52.[illegible]5 | 57.34 |
| 9 | 96.11 | 86.28 | 101.29 | 62.35 | 66.4[illegible] |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

TABLE B.2 (CONTINUED)

KARONGA RURAL DEVELOPMENT PROJECT (PART OF)

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 22.01 | 2.33 | 1.79 | 0.88 | 3.41 |
| 2 | 37.01 | 8.84 | 8.48 | 3.99 | 7.76 |
| 3 | 52.99 | 25.89 | 27.30 | 10.82 | 16.19 |
| 4 | 58.99 | 31.98 | 33.92 | 13.77 | 19.42 |
| 5 | 67.99 | 43.26 | 45.88 | 19.70 | 25.35 |
| 6 | 69.99 | 46.29 | 49.26 | 21.26 | 26.94 |
| 7 | 76.99 | 59.56 | 60.96 | 28.38 | 33.83 |
| 8 | 85.00 | 72.48 | 75.08 | 39.33 | 43.83 |
| 9 | 92.00 | 90.08 | 92.25 | 54.00 | 57.54 |
| 10 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

LILONGWE LAND DEVELOPMENT PROGRAM (PART OF)

| Ranked Economic Classes | (H) | (G) | (N) | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 17.80 | 2.37 | [illegible] | [illegible] | [illegible] |
| 2 | 35.00 | 8.94 | [illegible] | [illegible] | [illegible] |
| 3 | 54.01 | 21.45 | [illegible] | [illegible] | [illegible] |
| 4 | 63.81 | 29.46 | [illegible] | [illegible] | [illegible] |
| 5 | [illegible] | 41.15 | [illegible] | [illegible] | [illegible] |
| 6 | [illegible] | 44.[illegible] | [illegible] | [illegible] | [illegible] |
| 7 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 8 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 9 | [illegible] | 90.[illegible] | [illegible] | [illegible] | [illegible] |

## TABLE B.2 (CONTINUED)

### CENTRAL REGION LAKESHORE DEVELOPMENT PROJECT (PART OF)

| Ranked Economic Classes | (H) | G | N | ($N_W$) | ($N_T$) |
|---|---|---|---|---|---|
| 1 | 65.73 | 13.48 | 10.95 | 10.7[illegible] | 22.33 |
| 2 | 78.13 | 24.17 | 21.66 | 21.86 | 33.41 |
| 3 | 84.32 | 32.65 | 30.75 | 30.02 | 40.51 |
| 4 | 88.52 | 41.83 | 40.46 | 37.94 | 47.89 |
| 5 | 90.61 | 47.24 | 45.82 | 42.97 | 52.15 |
| 6 | 90.61 | 47.24 | 45.82 | 42.97 | 52.15 |
| 7 | 94.81 | 57.23 | 57.07 | 58.63 | 65.02 |
| 8 | 95.81 | 72.46 | 72.72 | 64.19 | 69.56 |
| 9 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

### LOWER SHIRE VALLEY DEVELOPMENT PROJECT (PART OF)

| Ranked Economic Classes | H | G | N | $N_W$ | $N_T$ |
|---|---|---|---|---|---|
| 1 | 19.49 | 3.54 | 3.65 | 3.34 | 4.[illegible] |
| 2 | 37.08 | [illegible] | [illegible] | [illegible]44 | [illegible] |
| [illegible] | [illegible]4.67 | [illegible] | 37.44 | [illegible] | [illegible] |
| 4 | [illegible] | 34.[illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 44.[illegible] | [illegible] | [illegible] | 44.[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible]4[illegible] | 27.77 |
| [illegible] | [illegible]44 | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | 4[illegible]4 | 44.[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible]4 | 56.[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 62.[illegible] |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |