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THE NEW TECHNOLOGY, AGRARIAN REFORM AND PEASANT DIFFERENTIATION IN ETHIOPIAN AGRICULTURE IN 1966-1980 WITH SPECIAL REFERENCE TO THE ARSI REGION.

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ABSTRACT

Critiques of the new technology in agriculture have expressed its class, technological, regional and crop bias. They call for expanded research to cover more crops suited to ecologically marginal areas, agrarian reform to distribute its benefits and the generation of mechanical technology and institutions amenable to the poor.

Ethiopia experienced both the dissemination of the new technology (first in 1967 in the Arsi Region and as of 1970 in limited parts of the country as a whole) and a radical redistributive agrarian reform (since 1975) aiming at a socialist transition in agriculture.

A micro level analysis of output and input in 30 farms disaggregated into the pre and post technology period on the one hand and poor/lower middle and rich peasants on the other is built upon to assess the effect of the new technology on production, factor productivity, the social differentiation of the peasantry, changes in the form and extent of the marketed surplus and prices in 1966-1975 (post technology, pre-agrarian reform) and 1975-1980 (post new technology and post agrarian reform) in the Arsi Region. This is further extended to Ethiopian agriculture as a whole including the countrywide redistributive impact of the reform, government intervention in marketing and the terms of trade.

The study argues that given the non-feudal, non-capitalist agrarian class formation in rainfed single cropping 'land surplus' agrarian economy, redistributive agrarian reform, state intervention with high marketing cost and the accumulation of merchant capital not reinvested into agriculture meet neither the redistributive nor the accumulation objectives of development.

E R R A T A

All tables, charts, maps and references/thereof, to chapters

where they start as:

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7 read as 5

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My wife Anne, suffered the externalities (in most cases negative ones) that go with this kind of work. I hope that she will be compensated by any possible light shed towards understanding the problem of agrarian transition.

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CHAPTER ONE

1.1 INTRODUCTORY NOTE

After several decades of concerted efforts towards development, most of the people in the so-called Third World find themselves in pervasive poverty. The condition of human survival is indeed precarious for the poorest of the poor as the recent famine in Africa has tragically demonstrated. The level of poverty and its distribution varies regionally, sectorally and more importantly by class depending on resource endowments,[1] state policy, class configurations and the attendant goals and strategies for development. But, if we focus upon the 34 'low income' economies identified by the World Bank (those with less than U.S. $410 per capita in 1981) - which contain about half the world population- the important structural characteristics of their economies is the preponderence of agriculture in the share of national income and employment and the relatively slow rate of growth of agriculture and therefore of the economy.[2]

In the years 1960-1980, the real per capita income in 'low-income economies' increased by less than 1% per annum. The growth of per capita agricultural output in 1970-1980 was nil.[3]

Amongst the 'low income economies', in Ethiopia the contribution of agriculture to the national economy, employment and exports is one of the highest (only 12, 12 and 17 coun-

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1. In oil producing countries, for example, such as Saudi Arabia, Kuwait, Bahrain, Iran etc. the basis of accumulation is a wider one, therefore the nature of poverty is different.

2. There is a wide range between these countries in the level of these important variables with more countries in Africa being mainly agrarian than in Asia and Latin America.

3. World Bank World Development Report 1983, p. 148

tries respectively had higher rates). It was also one of the few countries where per capita agricultural income declined in the same period. Following the agrarian reform in 1974/75, food imports increased from 18.7 to 62.4 mill. Birr - from 2.7% to 4.2% of imports (Griffin: 1985; p.39) While the economic, political and social condition of the poor is significantly different in socialist countries such as China and Vietnam on the one hand and non-socialist ones such as India and Pakistan on the other, in economic terms the problem of pervasive poverty and development in the non-mineral exporting poor countries may be equated with the social and economic problem of accelerating agricultural production and productivity and the mechanisms of accumulation - the problem of peasantry -: the problem of agrarian transition.[4]

In what follows, I shall use the notion of peasants in the sense employed by Saul and Wood[5] as those

> "....whose ultimate security and subsistence lies in their having certain rights in land and the labour of the family members on the one hand, but who are involved, through rights and obligations, in a wider economic system which includes the participation of non-peasants" (Saul & Wood: 1973, p. 105)

In this definition, the relation with non-peasants is neither restricted by the requirement of urbanization nor by the specification of the relation of the state with the peasantry. In our view, this allows for the study of the changing relation of peasants with non-peasants and the

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4. For the concept of agrarian transition and the positing of the agrarian question and its relevance to development, see Byres, T.J. "Agrarian Transition and the Agrarian Question" Journal of Peasant Studies Vol.4 No.3 April 1977 pp. 258-274.

5. For different notions of peasants in their historical and geographical diversity, see Shanin: 1973; Marx: 1970; Sahlins: 1960; Thorner: 1973.

emergence, dissolution and re-emergence of states conditioning the internal dynamics of peasants, their integration with external forces - the very processes which crystallize, and differentiate peasants from other cultivators - primitive communalists on the one hand and capitalist farmers on the other.

1.2 THE NEW TECHNOLOGY, AGRARIAN REFORM AND DEVELOPMENT STRATEGY IN THE POOR COUNTRIES

If development and the basis of accumulation in the non-mineral exporting poor countries could indeed be equated with agrarian transition, by most measures, the so-called new technology has been a landmark in the recent agrarian development of some of the poor countries into which it was introduced.

The term refers to the increasing use of a package of biochemical inputs (new seeds - mainly wheat and to a lesser extent rice - fertilizer, insecticides and water) and the associated mechanization (agricultural machinery, irrigation pumps) in some areas of poor countries with favourable ecological endowment, and infrastructural setting. The optimism of agricultural growth and agrarian transition albeit via the capitalist path, which symbolised its first coinage as a package appears to have somewhat waned and its reference diluted recently from miracle seed to high yielding variety and more recently just modern variety.[6] (Griffin: 1979, p. xi)

Within the new technology, a distinction is made between the biochemical inputs which are divisible and 'scale neutral' and the rather lumpy mechanical components requiring minimum outlays.

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6. We will use the notion of new technology; embodying a new labour process in the introduction of new seed, fertilizer and mechanization in the hitherto labour, oxen and plough and farm produced seed using traditional agriculture in the Ethiopian highlands.

of land and capital for their efficient utilization. Even the latter's scale economy is, however, said to be 'pseudo', since hiring/cooperative services and equality of access to credit could offset their scale bias (Lipton: 1977; Griffin: 1979).

The successful diffusion of the technological packages, the marked change in the rate of agricultural output growth in areas affected by it, the responsiveness of farmers to prices and associated change in product mix, the enhanced demand for off-farm produced inputs and consumption goods, the spiral of accumulation leading to capital deepening and expansion in agriculture have been extensively documented (Byres: 1972; Griffin: 1979; Lipton: 1977; Bisrat: 1976; Falcon: 1973; Ghose: 1976; Patnaik: 1976). At least in those limited parts of the poor countries[7] where the technological package has assured profitable opportunities with relatively stable levels of input and output prices, successive empirical evidence has refuted the 'cultural determinist' theories of development economists (Boeke: 1953; Georgescu-Roegan; 1960). The tool kits developed to investigate the backward bending supply curve as a special case in explaining the backwardness of poor countries and/or peasants were no longer tenable.

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7. Although some areas within countries such as the Punjab in India and Pakistan have shown remarkable growth rates of agricultural output, its overall impact is limited to foodcrops and within these to wheat and rice and a bulk of the latter mainly in the Far East. For the differential rates of growth of agricultural food (mainly rice and wheat) output in the 1955-1965 and post 1965-1975 new technology decades in the poor regions of the world, see Griffin K. The Political Economy of Agrarian Change, 1979, p.5. In the later period, only Africa showed a negative growth rate. In all, however, the only significant growth rate was that of wheat from 3.5% to 8% in the Far East, all of which can be by no means ascribed to the technology alone.

However, rich as the literature on the new technology in agriculture and its impact on the rural economy of the poor countries is, its evaluation and implications for development in general and agricultural policy making in such areas as agrarian reform,[8] agricultural input, product prices, and organisation of the agricultural sector have opened a wide range of debates which are by no means new.[9] Those embracing a technocratic approach to economic development in the poor countries welcomed it for its growth enhancing effects without much concern for its social and political consequences.

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8. Agrarian reform is referred to in the literature as a wide range of measures which extend from the change in terms and/or rights of ownership of land to credit, education, extension, marketing community development (U.N.: 1954, 1956 in Byres 1974). Byres defines it as "...attempts to transform the agrarian structure by altering the distribution of land and the terms upon which land is held and worked". (Byres: 1974, p. 223). We shall refer to this definition as it encompasses a wide variety of reforms.

9. The debate about the technology based on micro and macro analysis using the perspectives of the changing social relations of production in agriculture, the state and allocative efficiency in resource use has been going on in the pages of the Economic and Political Weekly since the mid-sixties. For a summary of the debate as it was in the early 70s, see Byres, T.J. "The Dialectic of the Green Revolution Technology" in South Asian Review vol. 5 No.2 1972, pp. 99-116. For a global assessment see Griffin K. The Political Economy of Agrarian Change, 1979; Brown, L. Seeds of Change: The Green Revolution and Development in the 1970s, London 1970; Pearse, A. Seeds of Plenty, Seeds of Want, Oxford 1980; Frankel, F. India's Green Revolution: Economic Gains and Political Costs, 1971. For a recent analysis of the economics of the technology in the most important state of India in this respect, see Bhalla, G.S. and Chadha, G.K. Green Revolution and the Small Peasant: A Study of Income Distribution among Pubjab Cultivators, New Delhi, 1983. For a series of micro studies dealing with rice, see Farmer, B.H. (ed) Green Revolution Technology and Change in the Rice Growing Areas of Tamilnadu and Sri Lanka, Westview Press 1977.

They more or less took the well known laissez faire dictum "growth will take care of itself" (Vyas: 1969; Sen: 1980; Cummings: 1969). Others deducing from the widely reported change in the organization of the production along capitalist lines with the effects of growth-mechanization, the consequent displacement and/or the change in the form of the employment of labour, the increasing rate of proletarianization, widening income differentials within peasant households and between the peasants and the agrarian bourgeoisie, call for state policy instruments to ameliorate these tendencies (Lipton: 1977; Griffin: 1979; Pearse: 1980; Ghose: 1979; Falcon: 1973).

When operationalized into concrete agricultural policy measures, the recommendations entail a more equitable distribution of resources especially land, credit, social pricing to foster selected production processes in resource use and crop output towards inputs using the scale neutral ones rather than the scale biased and the mainly foreign exchange using mechanization.

Except for the land reform component which requires a structural change in the control and use of land, most of the package of reforms could be viewed as corrections for market imperfections in land, labour and capital. Premised on the scarcity of capital and land at least in the short term, the control and the inefficient use of the latter by large holders, the abundance of surplus labour and the empirical evidence of higher land productivity on small farms,[10] a package of measures is suggested. These are meant to foster the pricing

10. Lipton argues that small family farms can saturate the land with plenty of labour per acre, as there is little else for the labour to do (Lipton: 1974, p.289).

of factors at their opportunity costs, capital saving - family labour using - production processes (with higher labour ⟶ capital ratios) which are said to be optimal from the viewpoint of employment, equity and efficient resource allocation.

From Lipton's argument for redistributive agrarian reform, allocative efficiency of land, labour and capital saving in production, distributive welfare in consumption between social classes and to some extent an optimal rating of time preference could easily be deduced (Lipton: 1974). Explicitly or implicitly such policy measures imply technical and economic (let alone political) ease in the substitution of capital by labour (which may not be possible as we shall see in Chilalo) and that of mechanical power by traditional capital.

Marxist scholars have sought to understand the new technology in terms of a mode of production approach within which it constitutes a change in the forces of production, giving rise to new (if any) agrarian structures. The uptake of the new technology, the resulting dynamic of the agrarian sector and its momentum are posited within the matrix of the configuration of class(es) and the distribution of class power in agriculture and the social formation at large manifested in the historical and contemporary specificity of

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11. The most cogent statement of this approach to development is found in Lipton, M. "Towards a Theory of Land Reform" in Lehman, D. Agrarian Reform and Reformism, Faber & Faber pp.269-315 Griffin, K. The Political Economy of Agrarian Change, 1979. The formalization of these premises, empirical evidence from Brazil and the case for redistributivist agrarian reform is found in Cline A.W. The Consequence of Land Reform in Brazil, Amsterdam, 1970. Cline A.W. & R.A. Berry Agrarian Structure and Productivity in Developing Countries, London, 1979.

the state internally and in its external relation with capital. The relation between farm size and productivity especially of land which is central in the restructuring of factor ratios in production and the components of demand and supply in agriculture to attain the development objectives set above, *ie* accumulation, growth, distribution, are predicated within the framework of the dynamism of the relations and forces of production in agriculture (Byres: 1972; Patnaik: 1972; Rudra: 1976). While these issues - the new technology, agrarian reform, land productivity in the context of the development objectives set above and evolutionary and revolutionary agrarian transition in their wider theoretical and historical aspect- are discussed in chapter two, the next section introduces the background to the new technology and agrarian reform in Ethiopia.

1.3 THE NEW TECHNOLOGY AND AGRARIAN REFORM IN ETHIOPIA

In Ethiopia, following an agreement between the then Imperial Ethiopian Government and Sweden, the new technology inputs were introduced in 1967 with the establishment of the Chilalo Agricultural Development Unit (hereafter CADU). The project built a network of research (crop, forestry, livestock, animal, machinery, local industry), extension (crop, animal, literacy), marketing and cooperative services (purchase of farm products and the supply of inputs (mainly fertilizer to a lesser extent new seed, ox-drawn new plough in credit), infrastructure (roads, water) and social services (nutrition, health services in limited parts) - see the attached chart portraying the diverse activities of the project It later (1975) embraced the other two sub-provinces of Arsi, Arbagugu and Ticho to become the Arsi Rural Development Unit (hereafter ARDU) - see attached maps

When it was planned in 1967 as the first of its kind in Ethiopia, the planning team outlined their approaches and strategies in CADU: (publication no. 1 1968, pp. 387-388). The specific operational objectives were set out as:

a) achieve social and economic development throughout the project area by concentrating on farmers of the lower income bracket;

b) explore and present findings of suitable methods for bringing about agricultural development in Ethiopia when applied in an integrated manner and create possibilities for replication elsewhere in the country.

c) train rural development staff for the project and for

others of similar nature that would ensue from the experiences gained by CADU.[12]

From its research and experimentation, the project made available locally tested innovations which were disseminated through an extensive extension system. The CADU employed what it called 'horizontal' and 'vertical' dissemination approaches to diffuse the innovations. The nucleus of the CADU strategy was the extension centre for an estimated 2000 households. The extension agent, his assistants in crop, forestry and animal production, marketing, women and youth extension agents maintained experimental and demonstration plots both as centres of testing the local suitability of the innovations and for advisory purposes. The horizontal method trained model farmers from whom others were to follow. This was later replicated in rural groups such as peasant associations, cooperatives and women groups.

From 1970, the CADU/ARDU innovation dissemination strategy was carried out in all parts of Ethiopia accessible by road transport. Unlike CADU, however, the Extension Project Implementation Department's (EPID) minimum package projects (MPPs) included only activities "....considered most essential for small farmer development, namely agricultural extension work and the sale of new inputs in credits in order to bring the benefits of development to a large number of people at minimum costs by employing the methods and innovations developed and tested in comprehensive packages projects"

12. The CADU/ARDU innovation diffusion strategy has been described and critically assessed in Bergman, G. CADU Evaluation Studies: Training of Model Farmers, Assela, 1970; Toborn, J. The Innovation Diffusion Process, CADU Special Studies No. 3 Assela, 1971; Hunter et al Final Report of the Appraisal of CADU & EPID, SIDA 1974; Solomon et al Evaluation of Arsi Regional Development Project Unit, ARDU, 1981.

(EPID, No. 13 1975 p. 1). The activities of the minimum packages were carried out in three stages - in observation areas (OA), demonstration areas (DA) and minimum package project areas (MPPAs) located along an all weather road, extending roughly for 76 kms. and encompassing a band of 3-5 kms. on each side of the road. Similar to CADU/ARDU, the operational goals of EPID were (EPID: 13, 1975 p. 3):

a) improvement in the standard of living of the peasant population;

b) continued improvements of methods for bringing about agricultural development in Ethiopia;

c) creation of possibilities for a continuous expansion of the effort through such measures as increasing the tax paying ability of the population.

The CADU/ARDU/EPID projects thus were the first regional and countrywide planned agricultural development projects in rural Ethiopia. As such, they have considerable historical significance. In comparison to the voluminous literature on Asia, however, they have so far received scant attention.[13] The first two studies from non-project analysts assessed the process of the diffusion of the technology and undertook a

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13. The new technology inputs in Ethiopia were mainly of fertilizer, seed (wheat and to a much lesser extent barley), traction and harvesting mechanical power (although they were not directly promoted by the project) with supporting services in research, marketing, cooperative, credit, infrastructure and social services/health education. The only price support offered was in the form of tax exempted imported fuel to mechanized farmers.

farm level cost benefit analysis[14] (Tecle: 1974; Bisrat: 1976). Gill considered the profitability of alternative technology - traditional, intermediate and tractor/combine-harvester, given the factor and product prices prevailing in 1975/76 (Gill: 1978). Their policy recommendations were akin to the analysts in Asia - the need for agrarian reform, and the discontinuation of non-taxed fuel to mechanized farmers.[15] Understandably, those who addressed their study to the impact of the new technology on the totality of agrarian change in Ethiopia (Cohen: 1975; Stahl: 1974; Kifle: 1972) almost exclusively focused on the negative social consequences of the new technology - the eviction of tenants. Few looked into the dialectics of the changing agrarian structure in terms of accumulation, growth, and equity locally in Arsi and within the framework of a development strategy for the national economy. With the introduction of the new technology and the high profitability which it brought in its wake (chapter six), first Chilalo and later Arsi as a whole were undergoing rapid change in production and productivity with manifestations of the development of capitalism in agriculture by the peasantry and mechanized farmers from within and outside.

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14. Using social prices, Tecle estimated a net return of Eth. Birr 126 and 80 per hectare for seed/fertilizer inputs in CADU and WADU respectively. In an extension area (with roughly 2000 households), farm size, extension contact, literacy and the availability of cash for down payment to purchase the new inputs were found to be positively correlated with the level of adoption (Tecle: 1974). In a later study, Bisrat demonstrated the lack of any significant difference in the adoption behaviour between the northern and southern peasantry on the one hand and tenants and owners on the other (Bisrat: 1976).

15. The demand for tractor services was in any case found to be inelastic with respect to fuel prices (Tecle: 1974, p. 173).

To a well known researcher, the process resulted in:

> "...Accumulated wealth for the few and increasing misery for the many.... as a consequence of the commercialization of agricultural production. By encouraging capitalist mode of production in the feudal regions, the IEG (Imperial Ethiopian Government) has rendered new features to the age old exploitation of the peasants. The Southern Highlands are being drawn into the modern, dynamic process of underdevelopment". (Stahl: 1974, p.153).

The working out of this process aptly described by the writer above was radically altered by the Ethiopian Revolution [16] and the agrarian reform of the Military Government in 1975.[17] The agrarian reform nationalised all rural lands: "... All rural lands shall be the collective property of the Ethiopian people" (chapter 2, Art. 3, No. 1). By doing so, and instituting peasant associations, their judicial and defence committees undermined the political, economic and to an extent the ideological basis of the hitherto tributary agrarian relations: "....the relationship between the landlord and tenants shall be abolished" (Chapter 2, Art. 6, No. 3); "No compensation shall be paid for rural land and any of the crops thereon" (Chapter 2, Art. 3, No. 3); "No person shall by sale, exchange, succession, mortgage, antichresis lease or otherwise transfer any land acquired" (Chapter 2, Art. 5), and "... All cases pending in courts

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16. For the causes, progress and assessment of the Ethiopian Revolution, see Halliday F. & Molyneux M. The Ethiopian Revolution, London, 1983; Markakis J. & Nega A. Class and Revolution in Ethiopia, Spokesman 1978; Ottoway M. & Ottoway D. Ethiopia: Empire in Revolution, New York 1978. Our position in relation to the discussion of the mode of production in agriculture is spelt out in section 6 of chapter 3.

17. While we outline below its salient features, an account of the implementation in 1975-79 in most parts of the country and the main provisions of the proclamation are found in Aster A. The Process of Land Nationalisation in Ethiopia, Bloms Boktryckevi, Lund 1982. For the social background to the reform, the formation and operation of peasant associations, in the redistribution of land in selected areas, see Dessalegn R. Agrarian Reform in Ethiopia, Scandinavian Institute of African Studies 1985. See also Alula Abute and Fasil Kiros "Agrarian Reform, Structural Changes & Rural Debt in Ethiopia, ILO, World Employment Programme, Geneva, Sept. 1980.

being null and void (Chapter 6, Art. 28 No. 1). Side by side, it also promulgated measures to arrest the development of private agrarian capitalism in agriculture: "... The amount of land to be allotted to any farm family shall at no time exceed 10 hectares" (Chapter 2, Art. 4 No. 5) and "...any large scale farm shall be owned and run by state or cooperatives or shall be distributed to the tillers for individual use (Chapter 2, Art. 7 No. 1). Chapter 3 of the proclamation also provides the institutional framework to implement the provision of the proclamation.

The Ethiopian agrarian reform of 1975 was thus both radical in forcing a revolutionary change of the relations of production between the hitherto "proto" landlords and the tenantry with no compensation for land to the former and the abolition of the emerging "proto" capitalist farmers and redistributivist in the sense used by Lipton (Lipton: 1974). The period 1966-1980 in the agrarian development of Ethiopia provides in succession, first the widespread dissemination of the new technology inputs in the context of development towards agrarian capitalism (1966-1975) and then a radical redistributivist agrarian reform with strong government intervention in marketing (1975-1980). This thesis seeks to identify some of the implications of what emerged for the theory and practice of agrarian transition in largely non-feudal and non-capitalist African rural social formations.

1.4 AIMS, DATA BASE, METHODOLOGY AND LIMITATIONS

By analysing the new technology at the micro farm level, and at regional and national levels, and by examination of land and labour productivity, taxation, the marketed surplus and the distribution margin between intermediaries, price trends, the terms of trade and their empirical relationship with agrarian reform, research problems will be indicated dealing with strategies for the redistribution for welfare, for accumulation and for investment nationally, regionally and at the farm level. In the context of revolutionary agrarian change, particularly in Africa, the Ethiopian experience may provide some insight into the issue of agricultural technology, state intervention, the peasant and strategies to embark on an endogeneously generated agricultural surplus for accumulation. It is hoped that the dissertation will pinpoint concrete problems of agrarian transition in Sub-Saharan Africa, in contrast with those of non-African social formations which are usually discussed in the new technology literature. That is to say, we focus upon agrarian social classes in the making, and a relatively land 'surplus' resource base in single cropping rainfed agriculture which characterize African agrarian social formations in contradistinction to the condition in Asia with its articulated agrarian social classes, irrigation as the leading input and with a labour 'surplus' agrarian scene.

In the analysis and sythesis of the main issues in the study enumerated above we have tried to integrate both the historical and empirical/statistical methods. Secondary historical sources, the first countrywide agricultural survey (1966-1968), farm level farm management studies in pre and post technology villages, extensive publications of CADU/ARDU and the annual crop sampling surveys of the Ministry of Agriculture are the main data base of the study. We have used the historical method, employed descriptive statistics and built simple analytic models - a partial correlation coefficient model controlling for variables (chapter five), a simple regression[18] model (chapter six) and demand and supply model (given the first countrywide census result of 1984 and agricultural surveys) were constructed to orient the study towards application and problem solving in chapters four, six and seven. We have chosen simplicity and clarity in model building rather than complexity and sophistication. Micro (farm level), regional (Arsi) and national (Ethiopia) analysis and synthesis are used to infer policy and amplify the argument of the empirical part of the thesis in chapters five to seven.

While the partial correlation model and the hypothesis it used to test peasant economy is set out in some detail in chapter five, the relation between the state, and the peasantry and relationship within the peasantry and the latter's demand and supply relationship have been concretized in terms of the marketable

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18. Our main interest being to test simple relationships of land productivity and factor inputs especially net sown area rather than actual magnitudes of farm management and resource use for prescriptive purposes, we deliberately avoided using the more realistic but complex production function analysis.

surplus of cereals.[19] To this effect, we have built simple analytical models for the base pre-technology period i.e. for 1966 (chapter four), for Ethiopia as a whole; for the pre-technology/pre-agrarian reform period (1966) for the post technology years (1966-1975), and for the post-technology and post-agrarian reform period (1975-1980) for Arsi (chapter six) and for Ethiopia (1970, 1975, 1980). The detail of the model is given in chapter four section six where it is first employed in the analysis of the marketed surplus in Ethiopian agriculture in the base period in 1966.

Since the seed fertilizer packages and even more the mechanical components of the new technology were used in very limited areas and among the grain cultivating peasantry on the Ethiopian temperate highlands[20] the study excludes a large part of the important commercial crop, coffee, in the south and south-west. In so far as part of these regions are exclusively used for grain cultivation or intercropped with coffee, the farm level analysis in chapter five may in large measure apply to these regions as well. The same chapter's application also excludes the so-called enset cultivating complex extending from Kembatta, Gurage, Derassa, Wollaita and Sidamo - a region with the highest density of population in Ethiopia and the rather sparsely populated nomadic and semi-nomadic areas. The discussion on the mode of production and agrarian structure, however, embraces

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19. In the absence of data on national marketed supply of cereals, we are compelled to estimate marketable quantity from the supply side. For the concept of the marketable surplus, its components and significance in the context of agrarian transition and development, see chapter four, section six.

20. For the delineation of agricultural systems in Ethiopia and the ecological subdivisions of the country, see Westphal. E. Agricultural Systems in Ethiopia, Centre for Agricultural Publishing and Documentation, Wageningen Netherlands, 1975.

both the grain and enset sedentary agrarian systems. Another major shortcoming of the study is the lack of time series data on the marketed supply of cereals to make any meaningful inference about price elasticity of supply and any possible shifts in demand following the agrarian reform and its income increasing effect among the middle peasants. We have instead tried to relate the change in the crop mix and their relative prices on the one hand with the increased disposable incomes by the peasantry, the real income of the urban working class and their implications for accumulation on the other following the reform.

1.5 SYNOPSIS OF THE CHAPTERS

Chapter two deals with agrarian structure in Ethiopia in the mid-sixties. It looks into the social and methodological basis of the identification of agrarian social classes. it suggests three agrarian systems in the analysis of Ethiopian agriculture. Given the incorporation of the tributary Empire via trade in agricultural commodities in the post-1941 period, it attempts to build the commonality of the agrarian systems based on the relative land labour ratio between and the ownership of oxen within each agrarian system. The chapter brings to the fore the specificity of the agrarian classes and strata of the peasantry within Ethiopian agriculture in 1967.

Chapter three is an empirical exercise dealing with the basis of the social differentiation positions of Chayanov and Lenin and testing the relevant hypotheses for Chilalo. Employing a partial correlation coefficient model, the salient hypotheses are tested in 20 farms using the new technology inputs and for others (10) in the pre-technology villages on the one hand and by poor/lower middle and upper middle/rich peasants on the other. The findings from this chapter are expanded on the empirical chapter in Arsi agriculture following the new technology - the use and productivity of resources (land, oxen, new technology inputs) and their implications in radical redistributivist agrarian reform.

Chapter Four assesses the social and economic impact of the new technology in Arsi as a whole before the agrarian reform of 1975 (1966-1975) and later 1975-1980. In 1966-1975,

the new forces of production unleashed by the new technology gave rise to new production relations; the beginning of the social differentiation of the peasantry, the making of an agrarian bourgeoisie from "below" and the associated higher levels of land and labour productivity, accumulation in agriculture and increases in the gross marketable surplus, net marketed output and the commercial surplus.

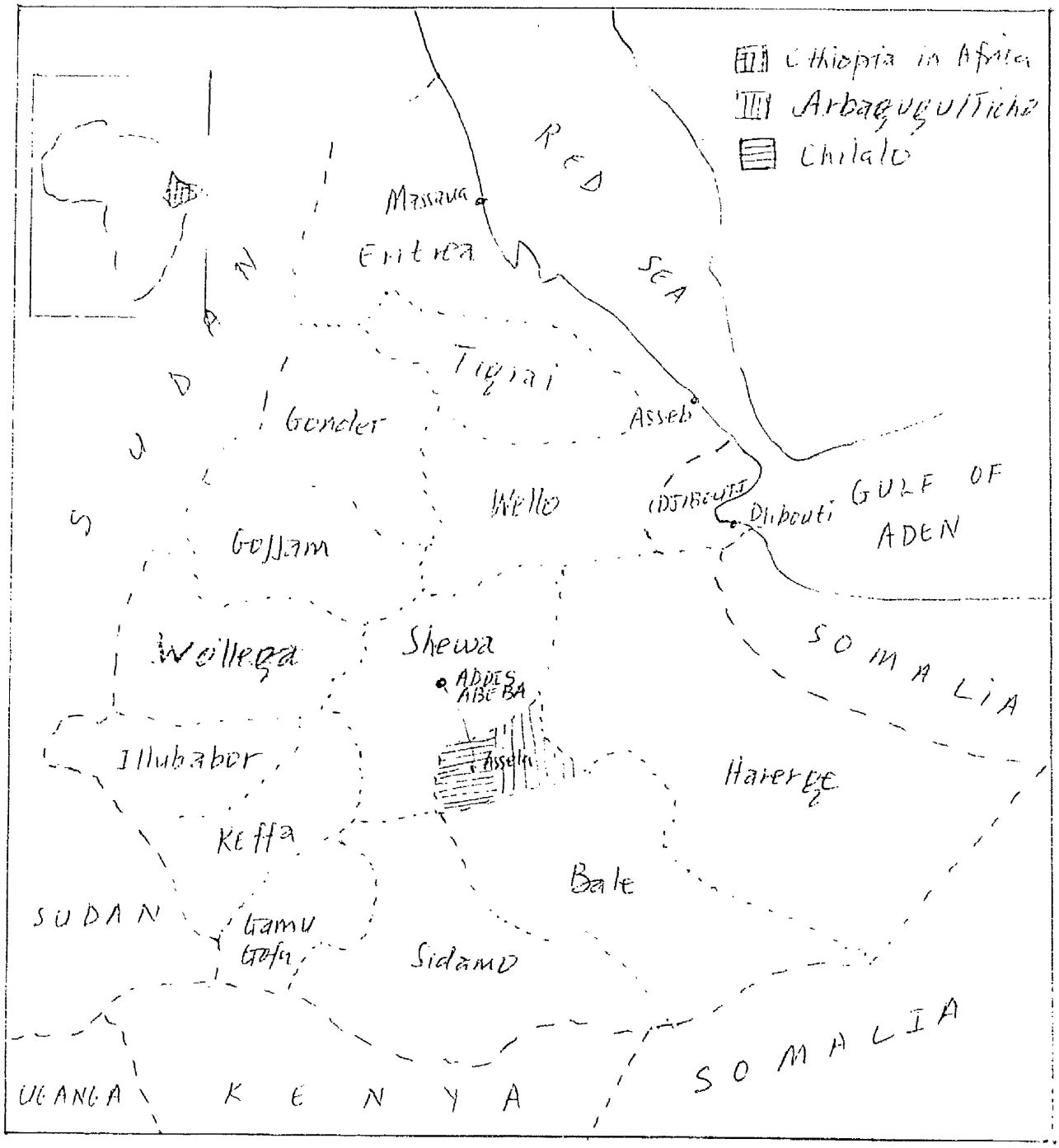
On the basis of the pre and post new technology and agrarian reform levels and changes in factor proportions, output, consumption and the marketable surplus, it is argued that a redistributive agrarian reform without reference to the prevailing mode of production, dynamic class analysis, resource base, prevailing factor ratios and the type of capital (in rainfed single cropping versus irrigation agriculture) and the implications for a reversed relation between land productivity and net sown area will meet neither the accumulation nor the redistribution objectives of development. The post-reform period appears to have accentuated the differences in incomes between the poor and the middle peasantry due to the unequal distribution of oxen and the lower mean levels of holding with the trend towards middle peasantization, possible fall in land productivity among new technology using peasantry and a regressive tax policy. This chapter demonstrates the case of an 'agricultural revolution' in Arsi following the new technolgoy.

Chapter five extends the analysis in chapter six to the whole of Ethiopia for 1970-1975 and 1975-1980. It argues that the reversal towards middle peasantization following the agrarian reform of 1975, wide marketing margins by the state

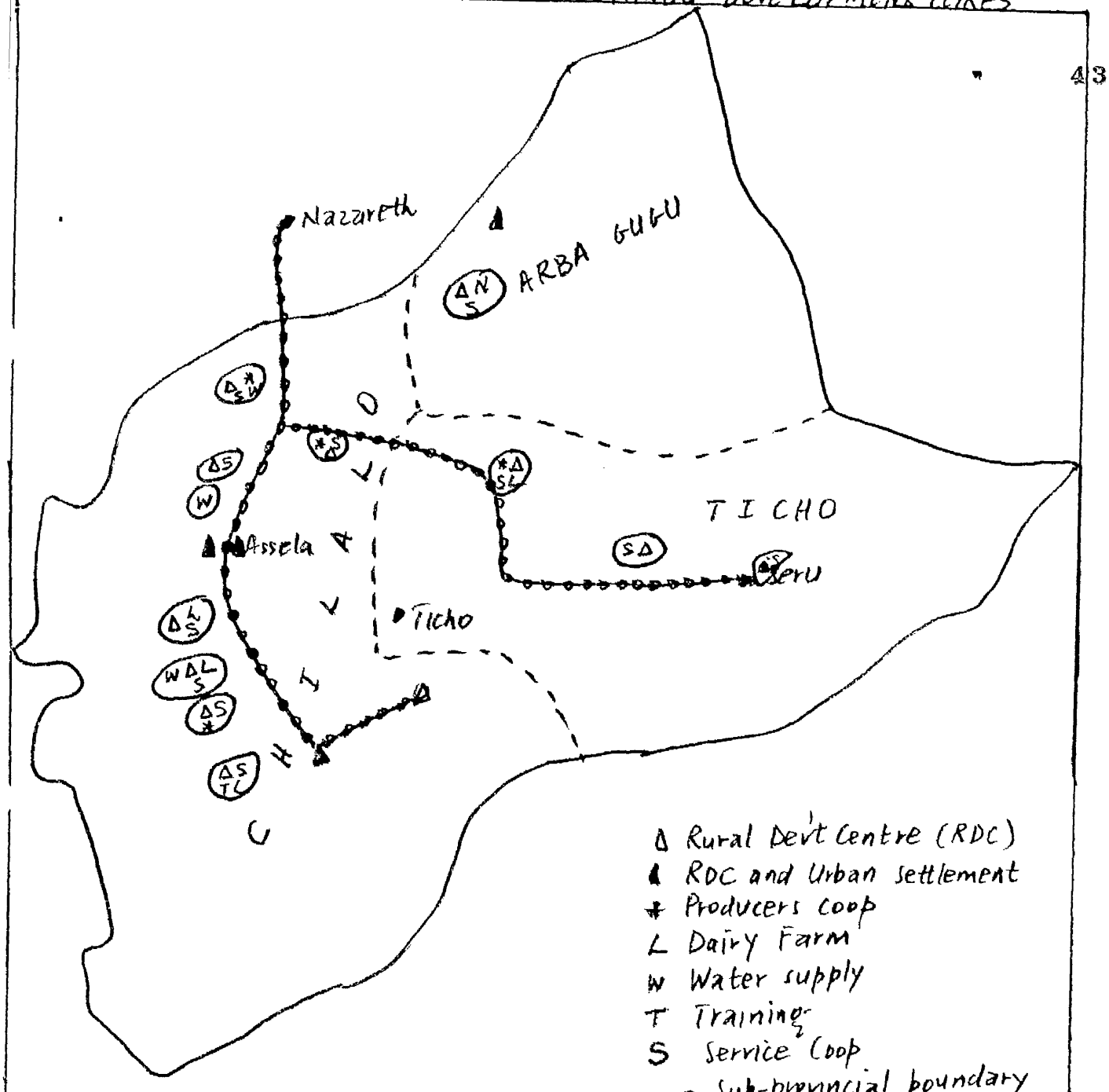
and middlemen not reinvested into agriculture, very high levels of retail and wholesale prices of cereals (especially the coarse cereals consumed by the rural and urban poor), given the pre-reform and pre-technology period forces of production, cannot be the basis for primary accumulation nor equity within the strata of the peasantry. The rapid rise in the consumption of fertilizer with nearly one third of the estimated urban and nomadic demand being met from its incremental output on the other hand suggests the widespread diffusion of the technology inputs. Most of the increased productivity is appropriated by the state marketing agency and middlemen.

Chapter six summarises the findings.

C·1·1 THE LOCATION OF THE CADU/ARDU..... PROJECT AREAS



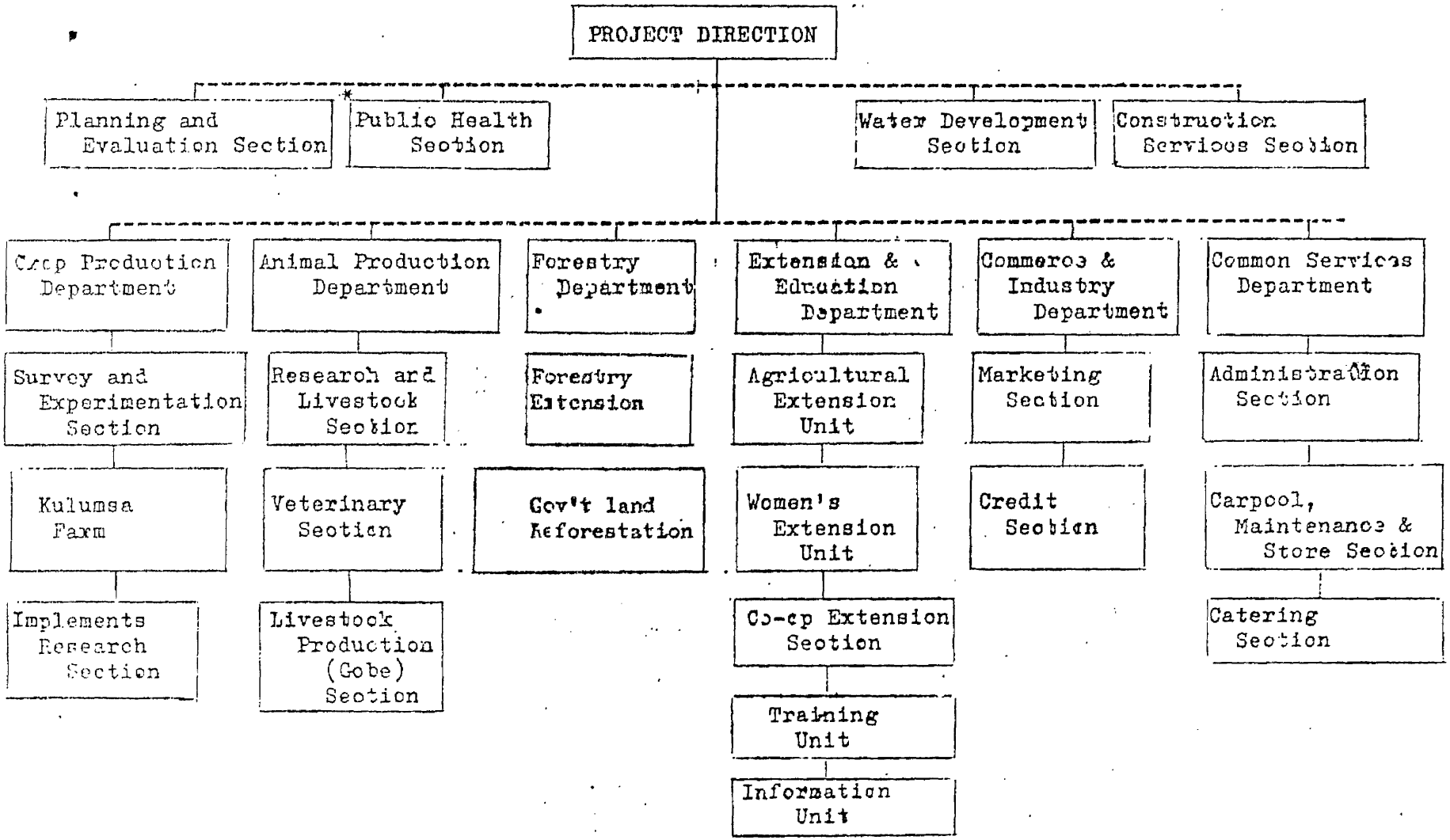
C. 1.2 THE DISTRIBUTION OF THE CADU/ARDU DEVELOPMENT CENTRES



Δ Rural Dev't Centre (RDC)
RDC and Urban settlement
Producers coop
L Dairy Farm
W Water supply
T Training
S Service Coop
--- Sub-provincial boundary
All weather road

Source: Solomon et al. Evaluation of the Arssi Regional Development Unit (ARDU) 1981 P. 71

C.1.3 CADU ORGANIZATION CHART, MARCH 1971



* Being transformed into Arussi Health Project under the Ministry of Public Health.

CHAPTER TWO

2.1 INTRODUCTION

With few exceptions (Ambaye: 1966; Henock: 1972; Stahl: 1973; Dessalegn 1985), the analytical domains of agrarian studies in Ethiopia have been either too historical/evolutionary (Berhanue: 1971; Mahteme: 1950; Gebrewold: 1961) or static and simplified, delineating tenants/owners, peasant/lords. The first approach identifies innumerable forms of tenure/ownership and highlights its "intricate" and "complex" pattern. The landlord/owner/tenant/owner dichotomy appears to have been accentuated by the coincidence of higher rates of tenancy in the South and the perseverence of the rist system and therefore of owners in the North. Rather than attempting to locate an analytical framework to understand the dimension and the dynamics of the agrarian system but largely seeking to identify the form of ownership (church, state, civilians, military), such studies have given rise to a proliferation of tenure and ownership systems (Gebrewold: 1961; Niecko: 1980). Lacking a dynamic analysis of the state, and of the incorporation of the tributary Empire into the world market via merchant capital, they understate the specificity of the agrarian system. The delineation of peasants and lords on the other hand fails to specify the process of class formation in the agrarian economy and the extent of stratification within the peasantry.

By the mid sixties, however, under the aegis of relative political stability in the post war period, possible population growth, the commoditization of agriculture, the agrarian social relations of production were changing not only between the 'great men' and the peasantry but within the'great men' and the peasantry. In this chapter, sections two and three raise theoretical and methodological issues in the social differentiation of the peasantry and the basis of the same among the Ethiopian peasantry. Section four delineates agrarian classes in the mid sixties followed by an estimate of the type, form, size and distribution of the marketable cereal surplus by agrarian classes followed by the conclusion.

2.2 THE THEORETICAL AND THE METHODOLOGICAL ISSUES

The social differentiation of the peasantry is preceded by and is the crystallization of commodity production in agriculture. The commoditization of agriculture (products, labour and the means and objects of labour) at various levels from natural economy[1] and the tendency towards social differentiation (agrarian class formation) and the transformation of the mode of production (if any) are in turn contingent upon the pre-existing social formation, the historical epoch (pre-capitalist, post-capitalist, colonial, non/semi-colonial), the specificity of the commoditization process (via merchant vs. productive capital) and the nature of the articulation. Marx locates the genesis of the social differentiation of the peasantry in relation to the formation of capital:

> "In ... insolent conflict with king and parliament, the great feudal lords created an incomparably larger proletariat by the forcible driving of the peasantry from the land, to which the latter has the same feudal right as the lords themselves, and by usurpation of the common lands. The rapid expansion of the Flanders wool manufacturers and the corresponding rise in the price of wool in England gave the direct impulse to these evictions. The old nobility had been devoured by the great feudal wars. The new nobility was the child of its time, for which money was the power of all powers. The transformation of arable land into sheep walks was therefore its slogan". (Marx: 1979 pp. 878-879).

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1. We have discussed in chapter one the context of our usage of the peasantry

Historically, the tendency towards rising productivity, the centralization of capital and its penetration of agriculture impinged on the forces and relations of production. The introduction into agriculture of better and higher per capita capital (with respect to labour and in most cases also of land) and the increased productivity of labour (and in most cases also of land as we shall empirically see in Chilalo, Arsi, Ethiopia) changed the basis of the appropriation of surplus labour.[2] The expanded reproduction these entailed with the dispossession/concentration, indebtedness and the ensuing trends in the polarization of the peasantry towards the agricultural proletariat on the one hand and the stratum of rich peasantry in transition to agrarian bourgeoisie (both from within and outside of the peasantry) and the development of generalised commodity production on the other form the essence of the social differentiation process: the contradiction between capital and/or dominant pre-capitalist agrarian classes (when the transition is incomplete) the peasantry, the agricultural proletariat and their relation to the State.

Marx showed both the prospect for the increasing subordination of agriculture by capital and the ensuing polarization and disintegration of the peasantry and the limits posed by usury and merchant capital in slowing down the pace of

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2. We are not suggesting a unilineal causation by the forces of production towards a change in the relations of production as has been argued by Meillassoux in the transition to agrarian class formation in pre-peasant societies (Meillassoux: 1978). The relations of production imposed following conquest and revolutions could impinge on the pre-existing agrarian structures and initiate a course towards agrarian transitions and new modes of production.

the same process[3] (Marx: 1964). Kautsky, while taking most of Marx's propositions, argued that increases in ground rent, tenancy rate, expansion of mortgages, parcellization through rights of succession, the intensified exploitation of the countryside by the town, the deterioration of the soil, the migration of labour and the recurrence of animal and plant diseases, could contribute towards the increasing cost of production in agriculture reducing its competitiveness vis-à-vis capital in industry, and counteracting the speedy socialization of agriculture along the lines in industry (Kautsky: 1976).

In the concrete situation of pre-revolutionary Russia, Lenin defined the sum total of all economic contradictions among the peasantry as the "... differentiation of the peasantry the utter dissolution of the old patriarchal peasantry and the creation of new types of rural inhabitants" (Lenin, 1964, p.239).

He identified a class of capitalist farmers (among the well-to-do peasants) originating from the peasant bourgeoisie (both depending mostly on the labour of the poor peasantry see below), the middle peasantry (distinguished by the least development of commodity production and therefore the independent use of their labour power) and the allotment holding wage workers (including poor peasants and those completely landless and subsisting by selling their labour power).

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3. Only where and when the other prerequisites of capitalist production are present does usury become one of the means assisting the establishment of the new mode of production by ruining the feudal lord and small scale producer, on the one hand and centralizing the condition of labour into capital on the other. (Marx: 1970, p.597).

Lenin distinguished between the American path (where there is no landlord economy or it is broken by revolution and the peasant evol ves as a capitalist farmer) and the Junker path (feudal landlord economy evolving slowly into capitalist farmers) to agrarian capitalism. He favoured the former for the latter condemns the peasant to decades of most harrowing expropriation and bondage (Lenin: 1964, p. 239). In a similar period and using similar data, Chayanov claimed that to a large extent the process was explained by demographic differentiation rather than a social differentiation towards capital and labour. The classical positions on the social differentiation of the peasantry (Marx: 1979; Kautsky: 1976; Lenin: 1964) mainly based on West European and Russian agriculture are posited on the inter-relations of autonomously developed industrial capital (especially in Western Europe) and agriculture and the expansion of the same mode in the European settled regions of the world.

On the basis of the extent of the exploitation of labour power, Mao delineated agrarian rural classes - landlords (owns land, does not engage in labour, lends money, hires labour and lives by exploiting peasants); rich peasant (owns and may rent land, has better instruments of production, more liquid capital, engages in labour himself but always depends on exploitation for part or even the major part of his income); middle peasant (as a rule does not exploit but himself is exploited); poor peasants (some own part of their land and have few implements, pay land rent and interest and sell part of their labour power), worker (owns no land or farm implements, make their living wholly or mainly by selling their labour power) (Mao: 1975). Unlike Russian agriculture at the onset of the 1917 Revolution, in

the Chinese agrarian system the transition from rich peasant to agrarian bourgeoisie appears not to have been made.

Methodologically, while retaining the appropriation of surplus labour via the hiring in and the hiring out of labour as the primary basis of the delineation of agrarian classes, Lenin used holding size (cultivated), horses, oxen, cows, allotment as indicators. (Lenin: 1964).

In the context of the poor countries, recent contributions have been made by Bardhan's adaptation of J. Roemer's work (Bardhan: 1982) by AbdelFadil, (1975) and by Patnaik, (1972). Bardhan's assumption of non-hiring in by family farmers - see footnote number 4 item no. 3 (the equivalent of the middle peasants in the classical model) and poor peasants renders it inadequate to capture the seasonal nature of agricultural tasks and the empirical findings of widespread hiring in conjunction with proportionally higher levels of hiring out by poor and middle peasants (Patnaik: 1972).

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4. On the basis of the extent of hiring out, self-employment, and hiring in of labour, Bardhan identifies 5 agrarian stratum and classes as when:

Self-empl.	1.	(SE)=0;	hir. in	(HI)>0;	hir. out	(HO)=0 Capitst/land
	2.	(SE)>0;	"	(HI)>0;	"	(HO)=0 Rich Farmer
	3.	(SE)>0;	"	(HI)=0	"	(HO)=0 Family Farmers
	4.	(SE)>0;	"	(HI)=0	"	(HO)>0 Poor Peas.
	5.	(SE)=0;	"	(HI)=0;	"	(HO)>0 landless lab.

Patnaik's[5] ϵ criterion by taking into account the appropriation of labour in the form of direct labour power and rent is able to make the analytical distiniction between agrarian capitalist cum landlord, feudal landlords and capitalistic and 'feudal' rich peasants on the one hand and between agricultural labourers operating their own land and petty tenants hiring themselves out and partly cultivating rented land among the poor peasantry on the other. In this scheme, the degree of the exploitation of surplus labour (wage vis-à-vis rent) and the ownership of the means of production capture both the forms (tenancy vs. landownership, capitalist vs. feudal landlord) and the mode(s) of production in the differentiation process. Patnaik's model, however, fails to provide a synthesis of the variously demarcated static agrarian classes. A priori designating holdings below 2

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5. Building on net labour days hired in (a); net labour days taken through rent (b); net total use of outside labour (y) a+b; family labour days in cultivation on the operational holdings (y); the E criterion as the extent of exploitation or being exploited is defined as E=x/y with:

Agrarian classes

1.	Landlord	$E \Rightarrow X$ X+ve & very high; y=0
2.	Rich peasant	$E \geq 1$ ... high; y+ve; $x \geq y$
3.	Middle peasant	$+1 > E > 0 \Rightarrow$ x+ve [illegible]
	Upper	$+1 > E > 0 \Rightarrow$ x+ve $\Rightarrow$ but small; y+ve; $x < y$
	Lower	$0 \geq E > -1 \Rightarrow$ x zero or -ve but small; y+ve; $/x/ < y$
4.	Poor Peasant	$E \leq -1 \Rightarrow$ x-ve & high; y+ve $/x/ \geq y$
5.	Labourer	$E > -x \Rightarrow$ x-ve & very high; y=0

Empirical characteristic

1.	Landlord	Remark
	a. capitalist	$a > b$ Lab. hiring in > rent
	b. feudal	$a \leq b$ Lab. hiring at most as high as rent
2.	Rich Peasant	
	a. Capitalist	$a > b$ Labour; hiring > rent
	b. Feudal	$a \leq b$ Labour at most as high as rent.
3.	Poor Peasant	
	a. Agr. Labourer operating land	$/a/ > /b/$ Hiring out rent payment
	b. petty tenant	$/a/ \leq /b/$ Hiring out at most as high as rent.
	c. Full time labourer	b=0; Hiring out only.

feddans (one feddan = 2 acres) as poor, 2-5 feedans as small, 5-20 feddans as middle and 20 feddans as rich peasants, Abdel Fadil positively correlates these strata with the increasing magnitude of wage labour employment, the intensity of improved farm equipment and differences in crop mixes in favour of fruit cultivation and other high valued crops (Abdel Fadil: 1975).

Notwithstanding the regional variations, in all cases the empirical basis of the methodologies developed above deals with agrarian structures and social differentiations set in motion by relatively long periods of the commoditization of agriculture, and a certain degree of the development of productive capital in agriculture with the advent of colonialism and the 'modernization' policies of the post-colonial state. Even in parts of Africa where colonialists introduced new production processes, and their dissemination proceeded with profitable returns to capital, agrarian studies report the limits posed to proletarianization in agriculture by the communal but privately used plots of land with little or no monopoly of land rights and the channelling of profits into non-farming operations (Howard: 1980; Cliffe: 1977). In Ethiopia, the commoditization of a tributary agrarian economy without a parallel change in the forces of production, the interplay of land and labour ratios on the one hand in a similar vein to that argued by Kritsman (Kritsman: in Cox '84 p13) and the demand for oxen power set in motion the parameters for the hiring in and the hiring out of land and labour and the beginning of a shift towards the social differentiation of the peasantry - a process which was accentuated with the introduction of the new technology in Chilalo.

2.3 THE AGRARIAN SYSTEMS IN ETHIOPIAN PEASANT AGRICULTURE

From studies of the land systems of Eritrea, Amabye Zekarias was the first to identify strata among peasants (Ambaye: 1966). Without saying so using Mao's (Mao: 1975) framework of classifying the peasantry in China, he attempted to define rich, middle and poor peasants on the one hand and "peasant labourers" on the other.[6] The peasant labourers and hired peasants who owned no land or implements were few and mostly outsiders. Rich peasants were distinguished by their possession of larger amounts of the non-land means of production (oxen, implements) dairy products from larger herds and their vegetable cultivation. Middle peasants supplemented their incomes in villages and towns, while poor peasants though owning land, had no implements or oxen. His stratification precluded land as a classifying variable because of his presumption that in this part of historical Abyssinia, there was no "land problem" for every qualified member was entitled to arable land[7] He also does not establish an estimate of the various strata. Although insiders had no explicit land problem, inequalities in the means of production and possession of oxen, and between rich and poor peasants which are clearly recognized by the writer may have led to variations in the extent of land under

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6. According to him the rist system in Eritrea precluded the emergence of a landlord class.

7. These assertions are, however, contradictory to his own identification of peasant labourers who had no land and without implements because of the restriction of access to land only to qualified members.

cultivation within the qualified members, as local anthropological studies in Gojjam and Tigre with similar agrarian systems as in Eritrea (Hobben: 1964; Bauer: 1977) have shown.

With a traditional agricultural technology using oxen, a holding size of up to 20 hectares was suggested as a cut off point requiring either mechanization or renting out of land and so indicating a transition from peasant to landlord. (Henock: 1972). Further refining Henock's work in delineating strata within the peasantry by holding size, another writer (Stahl: 1973) identifies poor peasants as those operating/cultivating the smallest holding - 0.01-3.00 hectares, middle peasants 3-10 hectares, but not hiring in labour and rich peasants cultivating 10-20 hectares themselves and renting out additional plots to tenants. Using 20 hectares as a lower limit for hiring in labour and/or mechanization, both writers limit the applicability of their work to some areas in the South where the new seed/fertilizer package programmes (a post-1966 phenomenon) enhanced profitability leading to mechanization.[8]

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8. A more recent writer (Dessalegn: 1985: p.61) rejects any attempt to structure the agrarian system on the basis of social classes because the Agrarian Reform "... has ruled out the emergence of a Kulak class in the countryside". The Land Reform confers usufructuary rights to all peasant households and sets an upper limit of 10 ha. for private holding (PMGSE: 1975). While these may arrest the increase in the number of the agricultural proletariat and the emergence of a landlord and capitalist farmer class if and when the agrarian reform is fully operational, the distribution of holdings and especially oxen in the post-reform period presented by the same writer - do indicate a distinct inequality of these resources (Table 4-11) establishing an exploitative social relation of production as we shall show. If oxen, rather than land (which is redistributed in the agrarian reform) are the most primary variable in the social differentiation of the peasantry as we shall argue subsequently, it is doubtful if this position is sustainable.

In the North, although no explicit land problem exists for the insiders, inequalities in the other main means of production, oxen, and between the rich and the poor peasants which are clearly recognized by peasant studies in this region including by Ambaye himself (Hobben: 1964; Bauer: 1977; Dessalegn: 1985) lead to variation in the extent of land under cultivation and the hiring in and the hiring out of labour. Given the demographic factor on the supply side of labour, varying man land ratio and the dominance of the traditional agricultural technology (4/ Table 4) the cut off point marking transition from peasant to landlordism and/or the differentiation within may have well been below the 20 hectares suggested by the above writers.

Within the predominantly tributary agrarian relation, rather than the conventional North South dichotomy, on the basis of the ratio of land and labour resources between the agrarian systems and oxen within peasant households we propose three agrarian systems in the analysis of Ethiopian agriculture and a methodology for the stratifying variables

The first one is the

1. Plough Agrarian System of the North (AGS1). This is the core tributary gebbar agrarian system of the Northern provinces of Eritrea, Tigrai, Begemder, Gojjam, Wello and the northern part of Shewa characterised by a high labour land ratio[10] and mostly owned[11] but small and highly fragmented holdings- relative labour surplus[12] plough agrarian system with about 43% of the cultivated land peasant households and nearly 60% of the landless peasants in Ethiopia as a whole.

2. The second system is the Hoe Peasant Agrarian System of the South (AGS2) The peasantry of the South mainly dependent on the "enset"[13] plant and with very high labour land ratio subjected to the gebbar agrarian system as in the North which evolved with higher rates of tenancy compared to the North in the post-1941 period. This agrarian system with only 15% of the country's cultivated land had nearly 23% of the peasantry (Table 5) but proportionally with a smaller number of landless peasants.

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10. This is so ~~Moreover~~ not only the absolute labour land ratio but more importantly the labour land capability (in terms of terrain, soil conditions for cultivation).

11. Appendix 2 Table 3a.

12. Labour surplus in relation to the available stock of land with the current forces of production (family labour, oxen, traditional seed) in rainfed perennial agricultural system. We do not have an empirical basis to ascertain the level of the marginal product of labour.

13. "Enset" is a banana-resembling plantation food crop (replanted once a year for seven years until it reaches maturity) whose roots and stalks are pulverized, fermented and baked into food. Although of low nutritional value, its resistence to drought and the high food land ratio vis-à-vis the grain cultures of Highland Ethiopia, has made the agrarian region most densely populated in the country. For more on the enset plant, see Shack W. The Gurage: A People of the Enset Culture, Chicago, 1965.

3. Thirdly, we identify the Plough Proto-Peasant Agrarian System of the South. This is the relatively recent ox-plough agrarian system of the South (the province of Arsi-the first in the dissemination of the new technology inputs; Bale, Keffa, Illubabor, Wollega and South-West Shewa) in transition from grazing to sedenterization, a process accentuated with the conquest of the South (Chapter three, section five). Here, we have relatively lower labour land ratio at the macro level which evol.ved with a much higher level of rented holdings in the post 1941 period.

In AGS1 and 2, under the gebbar/gultegna/neftegna[13a] agrarian relations, the appropriation of surplus was limited by land with varying and lower levels of tenancy compared to AGS3, with higher supply of land, larger cultivated holdings In AGS 3, and more ownership of oxen at the micro level, tenants cultivated on the average more holdings than owners within the agrarian system and compared to AGS1 and 2 (Appendix Table 1). Despite the higher levels of tenancy, only 3% of the agrarian households were landless. As we have argued elsewhere, thus tenancy per se is inadequate as a means of stratifying the pre-revolutionary agrarian system.

Contrary to the assertion of communality and egalitarian land holding in AGS1 (Ambaye: 1966; Dessalegn: 1985: Lawrence: 1966), although wholly tenant peasants were only 14.7% of the total households, with part tenants and landlessness as high as 45% of the total households rented in land. In agrarian system 3, the rate of tenancy is significantly higher than in agrarian system one. However, with less part renting and landlessness, not less than 35% of the households operated own holdings, as shown in the following tables.

13a. Peasant/lord/settler

Table 4.1 Ethiopia: Distribution of Status of Tenure by Agrarian System in 1966

a) Absolute % distribution of status of tenure by agrarian system:

Sl.	Status	AGS1	AGS2	AGS3	Total
1	2	3	4	5	6
1	Owners	23.7	11.8	11.4	46.9
2	Tenants	6.3	8.9	17.0	32.2
3	Part-Tenants	5.9	0.7	1.9	8.5
4	Landless	7.2	2.2	3.0	12.4
5	Total	43.3	23.2	33.5	100.0

b) % distribution of status of tenure by agrarian system (each status of tenure =100)

i	2	3	4	5	6
1	Owners	51	24	25	100
2	Tenants	20	27	53	100
3	Part-Tenants	70	8	22	100
4	Landless	58	19	23	100
5	Total	43	23	34	100

c) % distribution of status of tenure within an agrarian system (each agrarian system = 100)

1	2	3		4		5		6	
1	Owners	55		49		35		47	
2	Tenants	15	45	38	51	51	65	32	53%
3	Part-Tenants	14		3		6		9	
4	Landless	16		10		8		12	
5	Total	100		100		100		100	

Source: As in p.61.

Table 4.2 Ethiopia: The Ratio of Number of Households, Cropland, Livestock and Oxen by Agrarian System in 1966

SL NO	AGS	% of HH	Cropland		Livestock		Oxen		Average		
			%	Ratio	%	Ratio	%	Ratio	HA	Livestock	Oxen
1	2	3	4	5	6	7	8	9	10	12	13
1	AGS1	43.3	43.1	1.0	37.0	0.85	50.9	1.17	1.00	3.50	1.15
2	AGS2	23.2	15.2	0.7	20.8	0.90	10.7	0.46	0.66	3.67	0.45
3	AGS3	34.5	41.6	1.3	42.1	1.26	38.4	1.15	1.26	5.13	1.12
4	Total	100.0	99.9	1.0	99.9	1.00	100.0	1.00	1.16	4.08	0.97

Source: Compiled from Report on Surveys of 12 Provinces, published separately between 1966-1968 Addis Abeba

Ratio = % of cropland, livestock or oxen divided by % of households.

HH = Households

In the discussion of the social differentiation of the peasantry in Ethiopia above, the writers use either a combination of owner/tenant dichotomy with holding sizes within the framework of the existing technology (Tecle; 1974; Cohen: 1974) or only holding sizes with a transitional perspective from traditional oxen/plough technology to mechanization. (Hencock: 1972; Stahl: 1973). Both Stahl and Hencock pose the question of differentiation within the peasantry and between peasantry, rich peasant cum and/or proto-landlords as a choice faced by the landlords between self operation of owned lands using traditional technology and mechanization/hiring in labour to operate surplus land for rent. Except for a few localised areas in the South (AGS 3) in the post new technology period (1966-),[14] the choice appears to have been between self-cultivation by fully using one's own resources (land, labour, oxen) and/or renting out to tenants/peasants over owned/controlled lands in lieu either of a combination of rent, corvee labour and oxen services.

Several local agrarian studies in the North (Bauer: 1977; Hobben: 1964; Ambaye: 1966) (AGS 1) and later in the South (Stahl: 1977) have shown that while sizes of owned holdings are functions of inheritance (variations in family size in AGS 1 and 2 households), the basis of hiring in and hiring out of labour and renting in and renting out of land was the ownership of oxen. Bauer goes so far as to say that "... the rich of oxen gain access to labour

14. See Chapter five ., Appendix Table 1 on number of tractors.

and more importantly to land through the poor. The poor are the landlords of the rich" (Bauer: 1977, p. 5).

Given the similarity of the productive forces, the level of productivity in grain cultivation, predominance of production for use value (Table 10 in section 6), the agrarian relation discussed in chapter three, the tenant/owner[15] dichotomy especially in the characterization of the agrarian structure in the North and South and within the peasantry is misleading as it focuses only on the <u>form</u>[16] of surplus extraction between the peasantry and the tributary warlords within a tributary mode. It is of limited analytical use in illuminating the process of differentiation within the peasantry since tenants and part-tenants with surplus oxen service (Table 9) appear to have been a significant part of the surplus value appropriating peasantry (Table 7 .),[17] and cultivated more holdings than owners (Appendix 2 Table 1).

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15. The higher incident of tenancy in the South in the transition from the tributary mode was a matter of degree due to the higher land labour ratio. For a similar process in the North see Pausewang S. Land Markets and Rural Society (Rural Ethiopia 1840-1976) in <u>Proceedings of 5th conference, 1977</u>.

16. Apart from the fact that the level of access to own land is a matter of <u>only some degree</u> between agrarian systems as shown in table 4.1, most poor peasants were in fact 'owners.'

17. Prior to the new technology inputs, the low productivity of agriculture on the one hand and the vast stratum of the poor peasantry and agricultural labourers of whom about 1/3 were tenanted, on the other, meant that the surplus accumulated by the rich segment of the peasantry was likely to yield more return in the form of usury and livestock to exploit the survival needs of the poor peasantry. See Appendix 2, Table 6 for sources, levels and rate of interest in indebtedness.

In view of the predominantly owned inheritable plots in the North (AGS1), the relatively high supply and access to land and oxen in agrarian system 3 in the South and the very limited productive capital in agriculture leading to expanded production, following Kritsman and Lenin we suggest that a better way of identifying the extent of peasant differentiation is via the degree of control over holdings (owned or tenanted before the reform) through cultivation made possible by the ownership of the other means of production over the Ethiopian Highlands - oxen. Its ownership or lack of it led to the hiring in and hiring out of labour, and the accumulation in the reserve of stocks of food and cattle within the framework of the traditional forces of production.[18]

The paucity of data on the hiring in and the hiring out of labour precludes the use of classificatory schemes used for example by Patnaik (Patnaik: 1972). Taking the ownership of oxen as the principal basis for the hiring in of labour, the results of the country wide national sample survey gave the following result:

Table 4.3 Ethiopia: The Distribution of Oxen, Oxen Household Ratio and Holding Size in 1966

	Oxen			Holding		
SL NO	No. of Oxen Xi	% of HH	% of Oxen	Holding Size (Ha.) Yi	% of HH	% Holdings
1	2	3	4	5	6	7
1	0	25.4	0	0	12.4	0
2	0-1	45.7	23.3	0-1	58.4	25.5
3	1-2	18.4	28.2	1-2	18.1	25.6
4	2-3	6.0	15.4	2-3	6.0	14.7
5	3-4	2.1	7.4	3-4	2.5	8.7
6	4-7	1.8	10.2	4-5	1.1	4.9
7	7	0.6	15.4	5	1.5	20.5
8	Total	100.0	99.9	Total	100	99.0

Source: Compiled from IEG Report on a Survey of 12 Provinces, published separately between 1966-1968, Addis Abeba.

18. While the empirical relevance of this methodology is borne out by the discussion of the agrarian structure in section 5 of this chapter, its importance in the redistribution, growth and agrarian reform is the subject of chapter 7.

Table 4.4 Ethiopia: The Distribution of the Number of Oxen by Size of Holding in 1974/75

4a Absolute Percentage Distribution

SL NO	No of Oxen	Size of Holding (Ha)					Total
		0-1	1-3	3-5	1-5	>5	
1	2	3	4	5	6	7	8
1	0	22	6	1	7	0.4	29.4
2	1	22	7	2	9	0.3	31.3
3	2	12	11	4	15	0.1	27.1
4	3	1	2	1	3	0.3	4.3
5	4 & over	1	2	1	3	3.7	7.7
6	Total	58	28	9	37	4.8	99.8

4b Percentage Distribution with each Oxen Interval=100

1	2	3	4	5	6	7	8
1	0	75	21	4	25	0.4	100.4
2	1	65	20	6	26	9	100.0
3	2	43	38	14	52	4	99.0
4	3	20	42	27	68	10	98.0
5	4 & over	16	36	23	59	15	100.0
6	Total	58	28	9	37	5	100.0

4c Percentage Distribution with each Holding Size=100

1	2	3	4	5	6	7
1	0	38	23	12	20	5
2	1	38 (76)	25	23	25 (71)	11
3	2	21	41	44 (50)	42	45
4	3	1	3	6	4	7 (40)
5	4 & over	2	8	15	10	33
6	Total	100	100	100	101	101

Source: PMGSE. Computed from Data Book on Agriculture and Land Use in Ethiopia, Vol.2, Addis Abeba, Oct. 1982, p.283

The Table above brings out an almost one to one correspondence between the size of holdings and the number of oxen, with approximately similar percentages in each category except in the obvious case of the peasants without holding (cf. col. 8). A more precise relation between the size of holding and the number of oxen is given in the post reform period. [illegible] 76% of the holdings with less than one hectare had one or no oxen. At the other extreme, of the holdings with greater than 5 hectares, only 5% were without any oxen. 40% of the latter had more than a pair of oxen. For an independent operation of its agricultural tasks, a peasant household requires at least a pair of oxen. Taking the classifying variable oxen with those owning 1-4 as middle peasants, it is suggested that where xi represents no. of oxen and yi, no. of hectares of holdings:

$x_i = 0;\ y_i = 0$	agricultural labourers and marginal peasants;
$0 < x_i < 1$ $0 < y_i < 1$	less than one ox and a hectare of land, compelled to hire in oxen and/or hire out labour and land in lieu of oxen services and to supplement meagre incomes for its reproduction--poor peasants;
$x_i \geq 4$ $y_i \geq 5$	where the peasantry has more than two pairs of oxen, independently cultivate holdings with the possibilities for hiring out of oxen, hiring in of labour, renting in land and when a landowner renting out land and oxen as-rich peasant;
$1 < x_i < 4$ $1 < y_i < 5$	where with more than one ox the peasant has autonomy in oxen to cultivate own and/or rented plots perhaps with marginal balance in hiring in and hiring out of labour and oxen. middle peasants, further sub-divided into upper (2-4 oxen) and lower middle with less than 2 oxen.

Based on the above scheme, but only using the holding size for practical use, we provide in the next section the approximate distribution of the peasantry in each category and the social relations of production within the peasantry and between the peasantry and the aristocratic warrior class in transition to absentee "proto-landlords".

2.4 : AGRARIAN STRUCTURE IN ETHIOPIA IN THE MID-SIXTIES.

With the commoditization of agriculture, though to a very limited extent (Table 5, Appendix), the ownership of land by the hitherto tributary warlords and the functionaries of the modern state, the payment of tax in cash rather than in kind[19] and more importantly the introduction of the new technology in peasant agriculture towards the beginning of the mid-sixties, the agrarian structure began to show signs of change. It consisted of a very few but an increasing number of capitalist farmers, absentee proto-landlords, resident rich peasants cum landlords, a stratum of rich middle and poor peasants and an emerging migrant agricultural proletariat.[20] The emergence of rich peasants with more oxen from among the part tenants peasantry in agrarian system one and owners and tenants in agrarian systems two and three (Table 7 ..) points to the importance of livestock especially, oxen, as the source of accumulation and the basis of hiring in and hiring out of labour. This is perhaps because of the commoditization and the extent of variations in holdings under cultivation where concentration in land via the market is restrained by the rist system in the labour surplus North and the slow development of grain production in the land surplus South. Nearly one-third of all the peasantry equally distributed by strata were tenants[21] (PMGSE: 1982 p. 255).

19. This is so especially in AGS1 where over 80% of the tenancy payments were in kind. See Table 5 in Appendix .

20. Murray refers to them as "travelling proletariat" (Murray 1975)

21. Gilkes takes all the 446,660 households as agricultural proletariat with the assertion of 'mechanized feudalism' (Gilkes: 1975, p. 169).

1. Agricultural Labourers (xi=0; yi=0)

The 1966-1968 and the 1975 surveys give an estimate of the number of peasant households based on holdings (CSO: 1966-1968: 1975). For the twelve provinces (excluding Bale and Eritrea) while the rural households are estimated to be 3.6 million, holdings are given as 3.1 million. The agrarian status of the balance of 446,000 households however is nowhere specified in the official reports. Where even miniscule holdings 0.10 hectares are classified by size, the apparently landless households (12.4% of the rural households) see table 3 - apart from agricultural labourers - may have consisted of a significant number of artisans, married families without allotments, and household servants, although some of these may have figured in the low farm size groups.[22]

Elsewhere in the survey are other references to agricultural labour from which some notion of its size may be made. In the six provinces which reported employment in agriculture, the 2.2% of the farm households which came under this category were 214,275 (CSO: 1966-1968). If this rate were to be applied to the rural households in the twelve provinces of the survey, the agricultural labourers would be 487,226- close to the figure inferred for rural households and holdings. However, since the data do not specify the duration of employment and the status of the employee (whether oxenless, landless, poor peasants, seasonal migrants, artisans), considering

the generally small size of farms, the extent may be much lower than 487,226 or 446,600. Elsewhere, under occupation and the industrial status of the "economically active population" defined as 10 years old and above, agricultural labourers constituted 647,965 or 12.9% - a very close ratio to the rural household/holding disparity. Taking 1.74 economically active persons in a household it gives the size of the agricultural labour households as 372,392.

The size of the agricultural labourer households may be well below the 12.4% of the rural households. The agrarian system, however, contained a large number of pauperized peasants due to the pressure of labour on land in the two agrarian systems of the North and South and oxenlessness in agrarian system three. Rather than in the South where commodity production is more developed with export demand for coffee,[23] a higher percentage of the rural households under this category are in the North (Appendix , Table2). Coupled with the very low level of commoditization in Ethiopian agriculture, this is perhaps indicative of the fact that most of the agricultural labourer class is not a creation of agrarian capitalism[24] but of demographic pressure on agricultural

23. Coffee which accounts on the average for nearly 60% of the value of exports is produced in peasant holdings in agrarian system 3 (Keffe, Wollega, Illubabor) and agrarian system 2 (Sidamo, Harerge). Exports nearly tripled between 1944-1945 and 1956/57 from 14,000 tons to 44,000 reaching as high as 82,500 in 1972 (PMGSE. Data Book on Land Use and Agriculture in Ethiopia Vol.2 pp. 413-421. See also Teketel Haile Mariam 1973, p 29

24. In fixed capital, annual value of output and permanent employment in non-peasant agriculture mainly in the Awash Valley was estimated at only 27,64 million Birr and 37,000 labourers respectively. See Appendix . Table 6 . for the distribution of wage employment outside of traditional agriculture and defence and security.

land in the agrarian systems 1 & 2 and the lack of the other means of production in agriculture, oxen, in agrarian system 3.

2. Poor Peasants ($0 \leq xi < 1$; $0 < yi < 1$)

Although their shares of the cultivated acreage and oxen are 25.6% and 36% respectively, this is by far the largest segment of the peasantry, making up nearly 60% of the rural households. With less than one ox and a hectare of land holding (the cultivated land being less) it will have to hire in not only oxen in agrarian system 1 in the North, but also may be expected to hire out labour to supplement incomes to at least maintain its reproduction. According to the 1966-68 national sample survey, about a third of the households were indebted at the time of the survey (Appendix , Table 7) and over half of the loans were for food. Most outstanding agricultural loans were borrowed for food (51%), purchased from landowners (42%) and to a very limited extent traders.[25] While there is a wide regional variation, most loans were small (less than Eth. Birr 30), borrowed in cash and with interest rate varying from nil[26] to over 20% for bigger loans.

Excluding the hoe culture "enset" sections within the Southern provinces (where oxen power is not an essential input), in a regression equation with % of indebtedness of rural households as a dependent variable (Yi) and % of households with less than one ox (Xi) and ½ a hectare of holding (X2), as independent ones, only the positive relationship with oxen was significant (Appendix Table 8).[27]

25. This is perhaps a reflection of the low level of commoditization (the less significant share of merchants and landlords) and the tributary (absentee) nature of the 'proto-landlord' class. The latter's share as money-lenders is almost insignificant reaching no more than 10% (PMGSE, results of National SSSR Vol 4 INDEBTEDNESS

26. Aggregated from individual provinces. The source of such loans were 'not stated' and presumably from relatives, friends and neighbours.

27. See Appendix Table 8 for the result.

Similar results were obtained for borrowing for food. Whereas a large majority of poor peasants were possessors of rist in the North, only about 36% of the total were tenants (Table 7). Both in absolute terms and in relation with the other stratum by status of tenure, the largest segment of poor peasants were owners mostly in agrarian systems 1 and 2. Even for the nearly one third tenants, however, tenancy per se may not be an adequate measure of relative poverty within the poor peasantry as some writers on the agrarian structure of Ethiopia have contended (Tecle: 1976; Henock: 1972). In the "enset" agrarian system of the South (AGS2) where more of the miniscule farm sizes and oxenless peasants were found (cf. provinces of Sidamo, Southern Shewa, Gamu, Goffa in Appendix Table 7...), the abject poverty which may be deduced from the payment of tenancy rent is lessened by the non-requirement of oxen (and payment of rent) for cultivation and the relative food security (less prone to drought) and high carbohydrate yield per unit area.[28] Coupled with a more reliable rainfall, and the intercropping of the main cash crop, coffee in agrarian system 2 and the relative supply of cultivable land and larger labour market in the coffee picking season[29] in agrarian system 3, the economic if not the social position of the land owning poor peasantry in the North is more precarious as droughts in

28. The Sidamo region (agrarian system 2) with the highest proportion of holdings of less than one hectare (81%) had the lowest number of indebted peasants for the purchase of food (16%). See PMGSE, SRNSSR, Indebtedness Vol. IV, 1975.

29. For the production processing and marketing of coffee and its impact on the distribution of incomes, see Teketel Haile Mariam, The Production, Consumption and Marketing of Coffee in Ethiopia, Ph.D. Thesis Stanford Univ. 1973.

recent years have sadly demonstrated.[30] The prevalence of a numerous oxenless poor peasantry unable to reproduce itself from its own farms, within a very limited labour market and constricted by the backwardness of the productive forces is the predominant characteristic of the Ethiopian agrarian structure and it has far reaching implications for policies in the realm of redistributive agrarian reform, impacts on the changing terms of trade and taxation as we shall see in chapters six and seven.

Table 4.5 Ethiopia: The Percentage Distribution of Oxen by Agricultural System and Peasant Stratum in 1966

Stratum	OXEN	AGS1	AGS2	AGS3
Poor	0	19	38	26
LM	0-1	51	45	38
UM	1-2	20	12	20
MP	2-4	3	3	12
RP	4	2	1	4
TOTAL	Total	100	99	100

Table 4.5a Absolute Percentage distribution of Peasant Stratum by Agrarian System (All=100)

Stratum	AGS1	AGS2	AGS3	TOTAL
Poor	26.2	20.8	19.7	66.7
LM	12.9	2.7	11.8	27.4
UM	1.6	0.2	2.3	4.1
MP	(14.5)	(2.9)	(14.1)	(31.5)
RP	0.3	0.1	1.2	1.6
TOTAL	41.1	23.8	35.0	99.8

30. The incidence of borrowing in general and for food is much lower in agrarian system 2 cf. Appendix Tables 7 .a-d.

Table 4.5b Percentage Distribution between Agrarian Systems by Peasant Stratum (Each Stratum=100)

Sl. No	Status	AGS1	AGS2	AGS3	Total
1	Poor	39.3	31.1	29.5	99.9
2	LM	46.9	10.0	43.0	99.9
3	UM	40.0	4.0	56.1	100.1
4	MP	(46.2)	(9.1)	(44.7)	100.0
5	RP	19.2	7.6	73.0	99.8
6	Total	40.7	23.8	34.6	99.1
		41	24	35	100

Table 4.5c Percentage Distribution within the Agrarian System by Peasant Stratum (Each Agrarian System=100)

1	2	3	4	5	6
1	Poor	64	67	56	67
2	LM	31	27	34	27
3	UM	4	5	6	4
4	MP	(35)	(32)	(40)	(31)
5	RP	1	1	4	2
6	Total	100	100	100	100

Source: CSO, IEG; computed from Report on a Survey of 12 Provinces, issued separately in 1966-1968. For absolute numbers, see Appendix Tables 2 &3

Middle Peasants

Using the criteria above to identify the differentiation of the Ethiopian peasantry, owning at least a pair of oxen and an estimated 1-5 hectares of cultivated land, the middle peasants constitute about 1/3 of the rural households straddling between the numerically superior (70% poor peasants and agricultural labourers) and the social-economically dominant but very few rich peasants. With a near self sufficiency in oxen (an upper limit of 4,) they are futher sub-divided into lower and upper middle peasants. As with the poor peasants, only two-thirds of them were owners and part-owners. Proportionally more of the middle peasants are in the relative land surplus agrarian system 3 (40% [illegible] 23.2% of the countrywide peasant households) where the size of the poor peasant stratum is much less than in the relative labour surplus agrarian systems of North and South (agrarian systems 1 & 2).

Rich Peasants

Comprising only 1.5% of the rural households but having 20% of the holdings and 13% of the oxen (Table 3, Appendix), this is the socially and economically dominant section of the peasantry. Given the large size of the poor peasantry and landless peasants, this stratum is the vital source for hiring out of oxen (Bauer: 1977; Stahl: 1977; Hobben: 1964), hiring in of labour and the single most important source of rural credit (Appendix Table 7). Where tenancy rates are higher in agrarian system 3 while the ownership of land and rent could be an important additional source of accumulation, in the North with low levels of tenancy, the 'rich peasants' appear to have emerged from among the category of part/owners (of which 51% are from

AGS1) which with more oxen at its disposal hired out oxen and hired in land (Tables 6-9). While part owners are only 6.5% of the rural households, they made up 25% of the rich peasantry (Table 7.3). Part owners/tenants held larger plots, cultivated more plots, proportionally more of them owned livestock and hired in labour (Tables 8&9 below). On the other hand, their position as rich peasants rather than rich peasant cum proto landlords is borne by their average lower level of employment of labour compared to owners. About 70% of the rich peasants were in the land surplus agrarian system with only 35% of the rural households (Tables 5 and 9). Due to the limited amount of productive capital and the commoditization of agriculture on the one hand (Tables 10 & 11) and the rather large size of the dependent poor peasantry offering a massive demand of borrowing/working for food on the other, the rich peasantry's role in expanded reproduction in agriculture and transition to agrarian bourgeoisie may have been constricted by the opportunities for higher rates of exploitation via usury from accumulated reserve stocks of food and livestock.

Table 4.6 Ethiopia: Ownership of Oxen by Status of Tenure in Absolute Terms in 1966

Ownership of Oxen	Owners		Tenants		Total	
	No	%	No	%	No	%
1	2	3	4	5	6	7
With oxen	1,122,150	73	1,107,666	90	2,229,816	81
Without oxen	402,506	27	121,963	10	524,559	19
Total	1,524,656	100	1,229,629	100	2,754,375	100

Source: Computed from IEG, CSO, Survey of 12 Provinces, published separately in 1966-1968, Addis Abeba.

Table 4.7 Ethiopia: Size Distribution of Holding by Status of Tenure in 1974/75

SL NO	Status of Tenure	% of HH	Size Distribution of Holding in Ha (%)						$\bar{X}$ Holding	
			0-1	1-3	3-5	(1-5)	5	Total	Ha	Index
1	2	3	4	5	6	7	8	9	10	11
1	Part Owners	15	35.0	36.1	22.7	58.8	6.6	100	2.3	157
2	Owners	38	48	22	7.0	28.0	3	100	1.5	100
3	Tenants	36	55.9	30.7	8.0	38.7	3.3	99.9	1.4	93
4	Communal (AGSI)	11	16.8	2.4	0.5	3.0	0	100.2	0.8	55
5	Total	100	57.6	28.4	10.2	38.6	3.8	100	1.16	

Source: PMGSE. Data Book on Land Use and Agriculture in Ethiopia, Vol.II, AA, 1982 p.256

Table 4.8 Ethiopia: Hiring in of Labour by Status of Tenure in 1966

Status of Tenure	% Share in Holding	Employers			Employees	
		o/o of Employers	% Employer % Holding Col. 3 . 2	o/o Employing	% of Employers	% Employee % Holding Col. 6 2
1	2	3	4	5	6	7
Owners	51.6	76.4	1.5	3.3	92.7	1.8
Part Owners	3.4	7.2	2.1	4.0	2.7	0.8
Tenants	45.0	16.4	0.4	0.8	4.6	0.1
Total	100.0	100	1.0	2.2	100.0	1.0

Source: Computed from IEG, CSO, Survey of Provinces: 1966-1968 from various pages

Table 4.9 Ethiopia: Number of Plots, Average Size of Holding, Percentage of Ownership of Cattle and Hiring in of Labour by Status of Tenure in 1966

Status of Tenure	Plots > 3%	Average Holding in Ha	% Hiring in Labour	% Owning Cattle
1	2	3	4	5
Part Owners	53.7	2.33	4.0	90.8
Owners	21.7	1.49	3.3	85.2
Tenants	15.3	1.38	0.8	75.6
Total	26.0	1.52	2.2	82.6

Source: Computed from IEG, CSO, Surveys 1966-68.

"Proto"-Landlords:

The national sample survey data (1966-1968) provide only the size distribution of holdings defined as "all land used wholly or partly for agricultural production and operated by members of one household". It does not provide the extent of the size distribution of the ownership of land. Where such data was given for one province in the South following an official inquiry, it was estimated that 2% of the landowners owned more than half of the land (Lawrence: 1966). In a micro study in another Southern province, Wollega, 49 landowners held one-third of the non-government land in the district[31] (Hultin: 1977, p. 33). In 10 provinces, the maximum owned ranged from 61,400 to 2,000 hectares[32] (Appendix , Table). The same study reported that 0.2% of owners owned 75% of the total land owned in one province 'Harerge' (IBRD: 1973, Tables 4 & 5, Appendix , Table). About 28% of the owners and 40% of the land registered for tax purposes was owned by absentee owners.

The highly skewed distribution of owned holdings and the dominance of the absenteism of the owners are reflections of the social position of the tributary warlord class manning the administration of the post-1941 modern state (Clapham: 1968; Markakis: 1974) in transition to "landlords" and the subsequent additional ownership of hitherto communal grazing and proto-peasant lands by the tributary warlords and the emerging petty bourgeoisie (in trade, government administration and the military) (Cohen & Wentrub: 1976). The resident

31. A district could have several thousands of households.

32. As the report emphasises, the information is based on a district tax register; the maximum holding recorded is therefore the maximum within one particular district. As many large landowners held land in several districts, actual maximum holdings are likely to be in excess of the figures shown. Furthermore, the unit of measurement of a 'gasha' is usually in excess of 40 ha. especially in non-sedentarized areas (Pankhurst: 1968) both indicat-

"proto" landlords amongst whom a significant portion of the rich peasants may have emerged were indigenous tribute holders who had entitlement to part of the tribute in the pre-1914 post conquest period in the South.[33]

Most of the Ethiopian "proto"-landlord class in the land surplus and to some extent labour surplus agrarian system in the South was a military aristocracy, part of the state, yet far away from the day to day farming operations of the tenanted peasantry[34] (in innovation, credit, etc.) appropriating surplus labour in the form of sharecropping tenancy much in common with its social relation with the peasantry under the tributary mode of production (the average level of sharecropping was one third of the gross value of output, see Appendix Table11). The resident landowners, partly landlords and partly rich peasants exploited surplus labour in rent and corvée labour (Lawrence & Mann: 1966).

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32. (cont)
ing even a higher concentration of land.

33. Dessalegn Rahmeto refers to this section of the landowning class as local gentry Dessalegn R. Agrarian Reform in Ethiopia: Scandinavian Institute of African Studies. 1985

34. Following the agrarian reform of 1975, most of the Ethiopian "proto landlords" in as much as it was part of the state disappeared physically and socially with the dethronement of the Emperor and the top echelons of the civil service with little impact in the production process in the post reform period See Dessalegn R., 1985.

Prior to the dissemination of the new technology since the mid-sixties, there is no conclusive evidence to support the emergence of an agrarian bourgeoisie from among the Ethiopian peasantry or the ristegna/gultegna class. In the post mid-sixties period there was an increasing trend towards the commercialisqtion of agriculture in the Setit Humera lowlands (bordering the Sudan), the Rift Valley (Central Ethiopia) and Eastern Harerge (bordering Northern Somalia), engaged in the production of sorghum and millet (Ellis 1972; by farmers Kifle: 1972). Most of the capitalist farmer class was, however, found in the cotton and sugar irrigated plains of the Awash Valley partly owned and managed by foreign capital (HVA - Dutch in the upper and middle Awash Valley producing sugar and Mitchel Cotts, a British firm in the lower Awash) together with the local elites and educated urban Ethiopians.[35] Seasonal labour from the labour surplus agrarian systems 1 (highlands of Wello and Tigre) to Setit Humera and lower Awash and from agrarian system 2 (the enset areas of Kembatta and Gurage to the upper Awash).[36] According to estimates by an IBRD team, the value of output of cotton and sugar cane (all of which was not produced by the capitalist sector of the agrarian economy) amounted to 3% of the

35. For a history and development of capitalist agriculture in the Awash Valley, see Bondestam L. "People and Capitalism in the Awash Valley" Journal of Modern African Studies, Vol. 12, No. 3, 1974, pp. 423-434; Mesfin Wolde Mariam "Awash Valley Trends and Prospects" Ethiopian Geographical Journal, Vol. III No. 2 Dec. 1965, pp. 13-20.

36. See Appendix Table 6 on the distribution and size of employment in non-peasant agriculture.

agricultural output in 1971. (IBRD: 1973, Table 1, Annex 16). In the same year coffee alone of which 80% was marketed (Teketel: 1973, p. 185) made up 50% of the marketed agricultural output, Teketel comments about the organization of production as:

> "There are no particular cultural practices attributable to each of the above classifications.37 Some small holdings have as good or bad cultural practices as some large holdings, and there are large holdings that are the derivatives of the original wild coffee trees just as there are small holdings, many of the larger coffee fields are operated by owners, although a large proportion of them are owned by absentee landlords. Many of the absentee landlords are government officials who live in Addis Abeba, while a few are coffee exporters who have integrated their operations back to the farm Very few large scale farms are owned by non-Ethiopians" (Teketel: 1973, p. 44)

Given the preponderence of the marginal and poor peasantry in the agrarian structure and the relative small size and output by the rich peasantry, most of the marketed surplus in Ethiopian agriculture at the onset of the new technology was obligatory and 'distress' surplus.[38]

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37. The classification refers to the province with the more developed coffee farms supplying 40% of the export market. A total of 6,840 ha. were holdings of greater than 20 ha. (4.9% of the estimated 140,000 ha) comprising of 119 farms distributed as:

Holding Size	Number of Farms	%
20-29	34	28.6
30-39	12	10.1
40-49	35	29.4
50-69	6	5.0
70-89	17	14.3
90	15	12.6
TOTAL	119	100.0

Teketel: 1973, p. 42

38. See section 4.5 for the context in which we have used 'distress' surplus.

2.5 5 AGRARIAN STRUCTURE AND THE MARKETED SURPLUS IN ETHIOPIAN AGRICULTURE IN 1966.

Whether entirely through the market mechanisms or a combination of subsidies, price support, procurment, taxation (in money or kind), management of the terms of trade within and between agriculture, the marketed surplus[39] is an essential concept which integrates the demand and supply role agriculture plays in the process of development and accumulation. Its significance as an analytical and policy tool is even more important in the early stages of accumulation when agriculture has to provide not only the bulk of domestic investment, valuable foreign exchange and raw materials, but also the supply of wage goods. It could also be an important tool for regional distribution of income and investment policy. The transactions between agriculture and non-agriculture in the form of the marketed surplus and its components provide policy options and means in planning. The effective use of the policy instruments above in the planning of targeted growth, distribution and accumulation is dependent upon the level of the productive forces and the associated formation and relation of classes - the mode of production in agriculture and the social formation at large. In Ethiopia the size of the marketed surplus, its distribution by agrarian

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39. For a conceptual delineation, relation to agrarian structure and static and dynamic role in development and accumulation, see Byres, T.J. "Land Reform, Industrialization and the Marketed Surplus in India" in Agrarian Reform and Reformism, Lehman, D. (ed) Faber & Faber pp. 221-261; Bardhan, P.K. & Kalpana Bardhan. "Problem of the Marketed Surplus of Cereals" EPW Vol. 4 No. 26 June 28th 1969 pp.a103-a110; Bhagwati J.N. and Sukahomy Chakravarty "Contribution to Indian Agriculture Analysis: A Survey" American Economic Review Vol. 59 No. 4 part 2 Supplement Sept. 1969 pp. 1-73 Dandekar V.M. "Prices, Production and the Marketed Surplus of Food Grain". Indian Journal of Agricultural Economics Vol. 19 3&4 Jly/Dec. 1964 pp. 186-195.

classes and the manner of its extraction reflect the low productivity and commercialization of peasant agriculture on the one hand and the transitional nature of the agrarian relations and the state discussed in chapter three.

As pointed out in the section under methodology in chapter one section 4, we have attempted to measure the level of the marketable surplus by agrarian classes from the production side, using the results of surveys on population, rent/tax, farm consumption etc. From total cereal output, taxes and rent were aggregated under obligatory surplus. Inputs were taken as part of the total marketable surplus but considered separately. From total cereals less obligatory surplus, the disposal for consumption were generated including inputs. To derive the consumption demand, the number of households in each peasant stratum was adjusted by size of household (5.5 persons for poor peasants, 7 persons for lower middle peasants, 8 for upper middle, 7.3 for rich and 6.4 average) (PMGSE: 1975). For rural sedentarist households a minimum base level cereal requirement of 100 kgs[41] per person per annum as a base for landless and poor peasants was increased by a marginal propensity to consume their own cereals by 0.36, 0.63 and 0.08 among lower middle, upper middle and rich peasants. This was arrived at by adapting the result of a rural cereal consumption survey

40. Griffin and Hay estimated 157 kgs. to derive 2400 Kcal. as minimum consumption (Griffin: 1985, pp. 43-44). However, our familiarity with rural Ethiopia, the contribution of animal products and the recently reported ration of 47 kg./fly/p.m in Addis Abeba (Saith 1985 p. 166) prompt us to use a lower base figure.

(Thodey: 1969, p. 37) to take into account the fact of being only cereals, non-consumption obligations etc.[41] This gives a per household annual per capita consumption of 100, 142, 175 and 211 kgs. by peasant stratum - poor/landless, lower middle, upper middle and rich peasants. The farm output equivalent to the consumption need of each stratum was constituted as effective consumption demand. Since the landless, poor and lower middle peasants' minimum consumption demand are not all met from farm output, we also obtained minimum consumption demand including the deficit of the poor peasantry Thus for the landless/poor/lower middle peasants, effective consumption demand is less than minimum consumption demand in most cases. The difference between their effective and minimum consumption demand, paid out as obligatory surplus made up distress surplus. Inputs plus the balance between disposable for consumption and effective consumption demand make up the commercial marketable surplus. The obligatory and the commercial surplus constitute the gross marketable surplus. Deducting the difference between the effective demand and the minimum requirement for consumption (= the deficit of the lower strata of the peasantry=distress surplus) from the gross marketed surplus, we obtained the net marketable output of cereals.

The demand side of cereals was disaggregated into rural sedentary, nomadic and urban. While the rural sedentary demand was estimated as above, for nomads we assumed ¼ of

41. For average gross cereal income by peasant strata 1974/75 see chapter 7, section four Due to the high density of population in the enset areas, we assumed no further increase in the marginal product of labour nor area expansion but out-migration as indeed one such area alone provided 25% of the population of Addis Abeba (Horvarth: 1960).

the consumption level of the poor peasants. Using the result of the 1968 consumption survey for Addis Abeba (Ingvar: and Taye: 1969, p. 438), we assumed 80% of the Addis Abeba per capita consumption of cereals for all urban areas to take into account possible lower levels of incomes and consumption from own farms in the small urban centres and the decline in the purchasing power of the urban poor in the post-reform period (Griffin: 1985; Saith: 1985). For aggregate demand in urban and rural areas, we used the result of the 1984 census (Appendix in chapter 7) and extrapolated backwards by 2.6% and 6.6% for rural and urban population respectively (World Development Report 1983, p. 163). The distribution of households by holding sizes were obtained in PMGSE 1982 p. 258. On the estimated production of cereals according to 1966, 1970 and 1974/75-1979/80 surveys a constant 200,000 hectarage at a yield of 24 qtls./ha. (PMGSE: 1982, p. 30) was added in all years in lieu of enset. In both supply and demand we used quantity of cereals weighted by prices[43] The weighted 1971 mean prices of the main cereals were used to convert taxes into cereal equivalents. Due to the lack of time series data on the actual marketed surplus, we could not estimate the response of supply to prices and income changes due to the agrarian reform. The format used in

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43. At 1970 Addis Abeba wholesale prices and the mean output of cereals in 1974/75 - 1979/80 gave the percentage share of value of output as 35%, 25%, 14%, 13%, 11% and 4% for Teff, maize, sorghum, barley, wheat and enset. See chapter seven section four.

the estimation of the marketable surplus and its disaggregation is given in the following table:

1. Total output
2. Taxes[44]
3. Rent[45]
4. Obligatory surplus (2+3)
5. Inputs
6. Disposal for consumption (1-(4+5))
7. Effective consumption demand (1-4)[46]
8. Minimum consumption demand[47]
9. Distress Surplus (8-7)
10. Commercial surplus (1-(4+9)
11. Gross marketable surplus (4+10)
12. Deficit of the peasantry (8-7)
13. Net marketable output (11-12)
14. Imports-Exports[48]
15. Total Supply (13+14)
16. Total demand (urban+nomadic)
17. Balance (15-16)

---

44. 3% of the gross output in 1966, 1970 (IBRD: 1973, Annexe 13 Table 1) For 1975-80 20 BIRR/Household equivalent to 3% of the gross output at 1971 prices (Dessalegn 1985).
45. 1/3 of the gross quantity of output by 50% of the peasantry (IEG: CSO: 1966-1968 (Appendix Table/ Lawrence: 1966) = 17% of gross output in 1966 & 20% in 1975 to take into account the increasing level of rent (Cohen: 1972 p. 201)
46. As per adjusted household size and elasticity of deman for cereals by peasant stratum as in p.191
47. Effective consumption demand+deficit when 7<8 and using the marginal propensity to consume own cereal output by peasant strata as in p. 85
48. PMGSE: 1982 p. 436.

We have further disaggregated the components of output by peasant strata and made extensive use of index numbers for temporal, distribution by peasant strata and the breakdown of output by consumption, marketable surplus, obligatory surplus etc.

One useful index model for peasant strata employs 3-4 sequential tables illustrated as below:

a) Basic Table: Actual Frequencies

Time/Agrarian System etc.

PP	Row Total	
LMP		
UMP		
MP		
RP		
Total		Aggregate

b) Percentage Distribution - Total= 100

PP	Row Total	
LMP		
UMP		
MP		
RP		
Total		100

c) Percentage Distribution: Interstrata: (Row)= 100

PP	100
LMP	100
UMP	100
MP	100
RP	100
Total	100

d) Percentage Distribution: Intrastrata: (Col.)=100

PP					
LMP					
UMP					
MP					
RP					
Total	100	100	100	100	100

Table 4.10 Ethiopia: Estimates of Output, Tax, Rent, Consumption, the Marketable Surplus, the Demand and Supply of Cereals in 1966

a) Total '000 tons

Sl. No	Components of Output	PP	LMP	UMP	(MP)	RP	Total
1	2	3	4	5	6	7	8
1.0	Total Output[50]	615	946	165	(1,111)	638	2,365
2.0	Taxes[51]	22	34	6	(40)	23	85
3.0	Rent[52]	104	161	28	(189)	108	402
4.0	Obligatory Surplus (2+3)	126	195	34	(229)	131	486
5.0	Gross Disposal for Consumption (1-4)	489	751	131	(882)	507	1,879
6.0	Effective Consumption Demand[53]	489	751	131	(822)	68	1,439
7.0	Minimum Consumption Demand[53]	1,136	751	131	(822)	68	2,086
8.0	Commercial Surplus (5-7)	-647	-	-	(-)	439	439
9.0	Total Marketable Surplus (4+8)	-521	195	34	(229)	570	925
10.0	Deficit of Marginal Peasants (7-6)	647	-	-	(-)	-	-
11.0	Net Marketable Output (9-10)	-1,168	195	34	(229)	570	977
12.0	Imports[54]		-	-	(-)	-	52
13.0	Total Demand	541	-	-	(-)	335	856
14.0	Total Supply (11+12)	-1,168	195	34	(229)	570	977
15.0	Balance (14-13)						121

50. The acreage in 1966 based on a survey of 12 provinces 1966-1968 (Appendix 2, Table 4.3) and extrapolated acreage for Eritrea and Bale from 1970 & 1974-75 and assuming 15% of the holdings were fallow and 12% of the output was allocated for seed and loss (Griffin: 1985).

51. Based on monetary aggregate (IBRD: 1973; Annex 13, Table 1) converted at 200 Birr per ton (see table 8 in Chapter 7) and assuming an ungraduated proportional tax to incomes

52. Nearly 50% of the peasant households among all the strata were part and full tenants (PMGSE: Vol.II, p.216); and 1982 a sharecropping of ⅓ of gross value of output or 17% of total agricultural output (Lawrence & Mann: 1966; and CSO: 1966-1968 summarized in Appendix [illegible], Table 10).

53. Total households based on 1984 census (PMGSE: 1985; see Appendix 1, Table 1 in chapter 7 for breakdown).

54. PMGSE: Vol.I, 1982, p.41.

b) The Percentage Share of Output by Peasant Stratum: Each Row (Components of Output) = 100

Sl No	Components of Output	PP	LMP	UMP	(MP)	RP	Total
1	2	3	4	5	6	7	8
1.0	Output	26	40	7	(47)	27	100
2.0	Taxes	26	40	7	(47)	27	100
3.0	Rent	26	40	7	(47)	27	100
4.0	Obligatory Surplus	26	40	7	(47)	27	100
5.0	Gross Disposal for Consumption	26	40	7	(47)	27	100
6.0	Effective Consumption Demand	34	52	9	(61)	5	100
7.0	Minimum Consumption Demand	54	36	6	(42)	4	100
8.0	Commercial Surplus	-57	-	-	(-)	100	100
9.0	Marketable Surplus	-69	21	4	(25)	75	100
10.0	Imports						NA
11.0	Total Supply	13	20	3	(23)	53	99
12.0	Total Demand	61	-	-	(-)	-39	100
13.0	Balance(Percentage of Total Demand)						12

c) The Percentage Distribution of Output by Obligatory Surplus, Consumption & Marketable Surplus within Peasant Stratum: Each Column (Stratum) = 100

1	2	3	4	5	6	7	8
1.0	Output	100	100	100	(100)	100	100
2.0	Taxes	4	4	4	(4)	4	4
3.0	Rent	17	17	17	(17)	17	17
4.0	Obligatory Surplus	21	21	21	(21)	21	21
5.0	Gross Disposal for Consumption	(79)	(79)	(79)	(79)	(79)	(79)
6.0	Effective Consumption Demand	79	79	79	(79)	11	61
7.0	Minimum Consumption Demand	185	79	79	(79)	11	88
8.0	Commercial Surplus	-105	-	-	(-)	69	18
9.0	Marketable Surplus	85	21	21	(21)	89	39
10.0	Inputs	-	-	-	(-)	-	-
11.0	Total Supply	20	21	21	(21)	89	41
12.0	Total Demand	85	-	-	(-)	-	36
13.0	Balance(Percentage of total Demand)						5

Source: Derived from Table 10a

Using the sample model outlined above (which is also used for the Arsi region in chapter 6 and Ethiopia in chapter 7), of the estimated total output, the obligatory surplus consisting of tax and rent constituted 20% of the total output. The agricultural land tax of 4% compares favourably with other poor countries. With an estimated 18% of total output constituting commercial surplus, the marketable surplus of cereals was 39% of the total output. Considering that the poor and marginal (landless) peasants disposal for consumption (total output less taxes and rent) is only 63% of their minimum requirement level of cereals consumption; most of the tax/rent from this strata of the peasantry (26% of the obligatory or 5% of the total output) was distress surplus. Together with landless peasants, the combined rural demand to meet minimum levels of consumption by far exceeded the urban and nomadic demand for cereals. This brings to the fore the crucial impact of a fall in the level of output (due to weather or otherwise) on the poor and the landless peasantry (making up about 70% of the rural households) directly through the disposal for consumption and indirectly through the curtailment of their employment opportunities from the better off households. It also indicates the adverse effect of redistributive agrarian reform in areas with available land to be brought under cultivation with labour and oxen inputs, as we shall see in chapters 6 and 7 in analysing the effect of the land reform in the distributions of incomes and its prospects for accumulation. Middle peasants accounted for half of the obligatory surplus or three quarters of it with poor peasantry. While the commercial surplus made up 46% of the total marketable surplus, almost all of it originated from the rich peasants. (Table 4.10-11).

A further breakdown of the marketable surplus by peasant strata and its distribution into tax, rent and the commercial surplus and the flow of rent surplus indicates that 62% of the total surplus is accounted for by the rich peasants. While tax, rent and the commercial surplus made up 9%, 43% and 47% of the marketable surplus respectively, for the poor and lower middle peasants, as much as 82% of the surplus derived from them is "rent-distress surplus" (cf. their effective and minimum consumption demand in Tables 9-10).

Given the distribution of the holdings and the tax surplus due to the state, we further disaggregated the 'ownership' of the marketable surplus as a benchmark for comparison with post-reform period agrarian structure.

The source and the flow of the marketable surplus, and its breakdown by peasant strata, type (tax, rent and the commercial) and by time period in 1966 - the base period for the new technology in Arsi; 1970 - the base period for the new technology for Ethiopian agriculture as a whole; 1975 - the onset of the agrarian reform and 1980 - the end period of our study are analysed in chapters 6 and 7. From this a number of policy inferences are drawn in the concluding chapter.

Related to the low level of the productive forces, and the numerousness of the marginal and poor peasants, 38% of the total marketable surplus from these strata may have been "distress surplus". According to our estimates in Tables 9-10, of the projected total marketable surplus as much as 60% of it could have been "buy back" or monetory and

Table 4.11 Ethiopia: Estimated Distribution of the Marketable Surplus by Type and Peasant Stratum in 1966

a) Total

sl no	Strata	Rent	Tax	Commercial Surplus	Total Surplus
	1	2	3	4	5
1	PP	104	22	-647	-521 (126)
2	LMP	161	34	-	195
3	UMP	28	6	-	34
4	MP	(189)	(40)	(-)	(229)
5	RP	108	23	439	570
6	Total	402	85	439	925

b) Percentage Share of the Components of the Marketable Surplus in each Peasant Stratum: Each Column=100

	1	2	3	4	5
1	PP	26	26	-	14
2	LMP	40	40	-	21
3	UMP	7	7	-	4
4	MP	(47)	(47)	(-)	(25)
5	RP	27	27	-	62
6	Total	100	100	100	101

c) Percentage Share of the Marketable Surplus by each Peasant Stratum: Each Row=100

	1	2	3	4	5
1	PP	82	18	0	100
2	LMP	82	18	-	100
3	UMP	82	18	-	100
4	MP	(82)	(18)	(-)	100
5	RP	19	4	77	100
6	Total	43	9	47	99

Source: Derived from Table 10a.

Table 4.12 Ethiopia: Appropriation of the Marketable Surplus by Peasant Stratum in 1966

4.12 a) Total in '000 of tons

SL No	Strata	State	PLLRP	APLL[55]	Rent	Urban Demand	Total
1	2	3	4	5	6	7	8
1	PP	22	52	52	(104)	647	126
2	MP	40	95	94	(159)	-	229
3	RP	23	54	54	(104)	-	570
4	Total	85	196	195	(391)	439	925

4.12 b) Percentage Distribution of the Total Marketable Surplus

1	2	3	4	5	6	7	8
1	PP	2	6	6	(12)	-	14
2	MP	4	10	10	(20)	-	24
3	RP	3	6	6	(12)	47	62
4	Total	9	21	21	(42)	47	100

4.12 c) Percentage within each Peasant Stratum: Each Row 100

1	2	3	4	5	6	7	8
1	PP	17	41	41	(82)	-	99
2	MP	17	41	41	(82)	-	99
3	RP	4	9	9	(18)	77	99
4	Total	9	21	21	(42)	47	98

4.12 d) Percentage Distribution within each Type of Surplus: Each Column 100

1	2	3	4	5	6	7	8
1	PP	26	26	26	26	-	14
2	MP	47	48	48	48	-	25
3	RP	27	27	27	26	100	62
4	Total	100	101	101	100	100	101

PLLRP "Proto" Landlord rich peasants
APLL Absentee "Proto" landlords

55. Based on estimated percentage of resident and absentee "proto" landlords (Appendix , Tables & 9 and 10).

kind payments to the poor and lower middle peasants.[49] Judged from the type and level of imports of agricultural inputs (Appendix Table 12-14), most of the rent income commanded by the "absentee" proto-landlords may have been directed towards the consumption of imported luxuries. The state appropriated taxes in general and from agriculture in particular indirectly from foreign trade (about half of state revenue) in which 96-98% of its primary source (export) were agricultural products (Appendix Table 15). Hence apart from the very low level of the home market deriving from the commercial surplus, absentee landlordism, the varying consumption demand of the state and the proto-landlords on the one hand (oriented towards the world economy in the purchase of consumption goods and investment in buiilding) (See Appendix Table 13) and the peasantry on the other, the social relations between the peasantry and the proto-landlords were indirect. The surplus of agriculture appropriated via foreign trade and rent income of the absentee proto-landlords were thus linked externally with the world market. This external linkage of the surplus from the agrarian economy, the relatively high levels of the marketable surplus being obligatory and distress surplus among the poor and the lower middle peasantry, the almost total command of the commercial surplus by the rich peasantry

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49. This has a very crucial implication in the evaluation of the effect of agrarian reforms. Where such reforms were redistributivist counterposed on low levels of the productive forces, the lowering of average holdings, the rising prices of cereals in relation to wage and urban goods appear to have decreased the post-reforms real income of the poor peasants as we shall discuss more fully in chapters 6 & 7.

and the overall deficit requirement by the poor and marginal peasants (as much as 60% of their minimum consumption demand (Table 12b row 9 col. 3) have important distributive, accumulation & policy implications under the reformed agrarian structure, given the base period mode of production outlined in chapter three.

2.6 CONCLUSION

Within the tributary mode, we suggested three agrarian systems based on the relative supply of land and labour within the framework of the traditional forces of production. With the commonality and the dominance of the tributary mode in both North and South, the widespread inheritable plots of land in agrarian system 1, higher supply of land in agrarian system 3, we further argued the ownership of oxen enabling the renting of land and the hiring in of labour which provides a better analytical framework to understand the process of social differentiation within the peasantry.

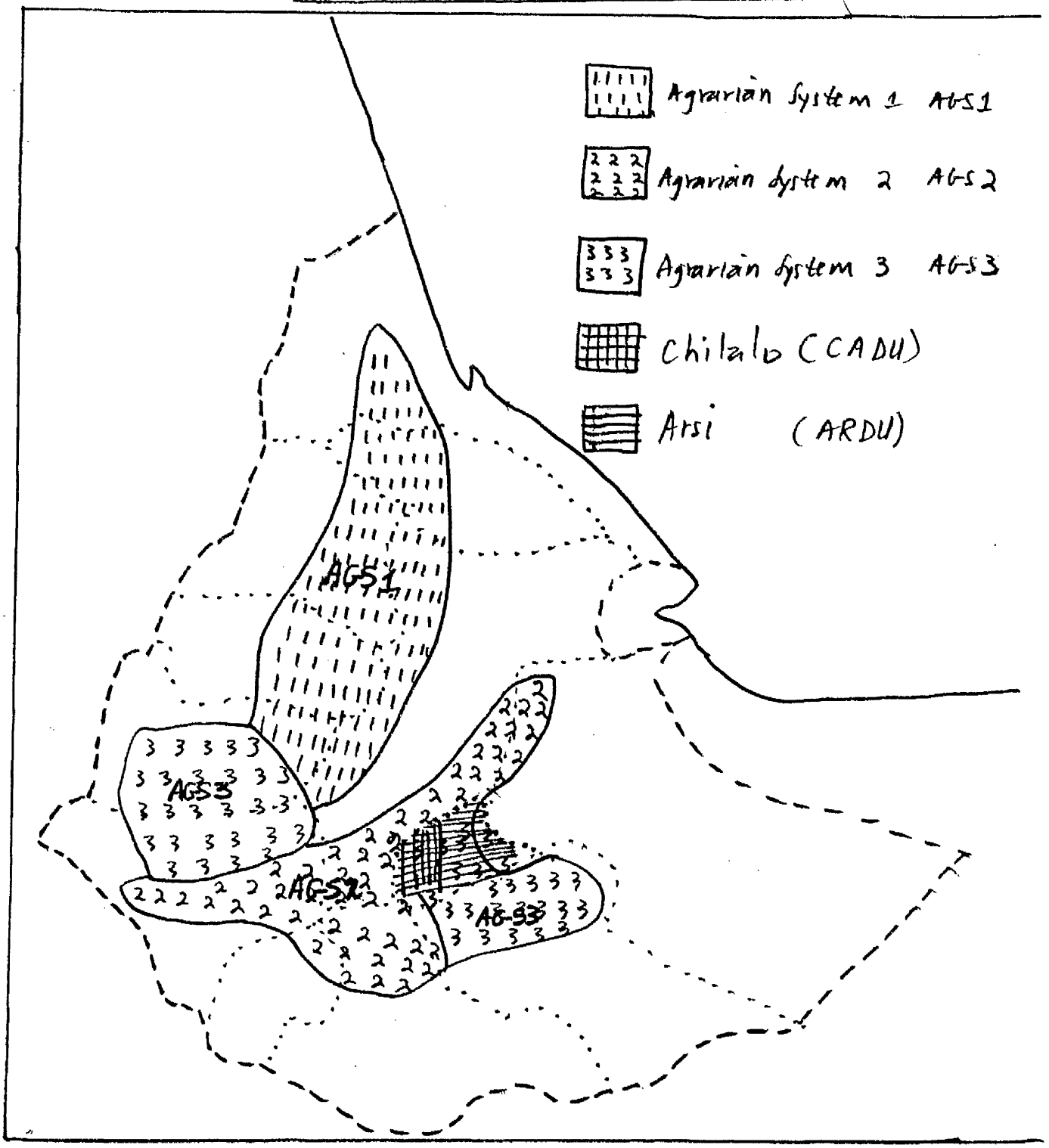
At the onset of the new technology, the Ethiopian agrarian structure was dominated by absentee proto-landlords, in the service of the tributary state in their lower ecehelon consisting of the rich peasant cum resident proto landlords. Among the peasantry, the resident landowner rich peasants with surplus cattle, oxen and grain were the main sources of rural employment, credit and the hiring out of oxen. Nearly 94% of the agrarian households were marginal, poor and lower middle peasants of which about 70% were found in the labour surplus agrarian systems of the North and the South. The agricultural proletariat in the capitalist farming sector from the labour surplus agrarian systems of the North and South seasonally migrated to the coffee regions in the South and the areas of capitalist farming

in the Awash Valley and the Humera Plains.

The size of the agricultural surplus and its potential for accumulation and growth were constrained by the low level of the productive forces and the external linkage of the surplus. The bulk of the marketed surplus commanded by the absentee proto landlords and the rich peasants was tenancy rent from poor and middle peasants dissipated in the consumption of imported consumption goods and investment in urban buildings by the former, consumption, payment of wages, services and loans to the poor and marginal peasants by the latter. The home market for non-agricultural goods and services in the agrarian economy may well have been less than 5% of the gross national product.

Given the agrarian structure discussed in this chapter, chapter five tries to elucidate factor relations and productivity in agricultural production and their implications for restructuring the agrarian sector in the context of the new technology and agrarian reform which are the main subjects of the discussion in chapter six and seven.

C.4.1 ETHIOPIA: THE LOCATION OF CADU/ARDU AND THE THREE AGRARIAN SYSTEMS



C.4.2

NOTE ON THE SURVEY OF TIGRE, BEGEMDER, WELLO, GOJJAM, SHEWA, WALLEGA, ILLUBABOR, KEFFA, GAMU GOFA, SIDAMO, HARERGE AND ARSI PROVINCES

Between July 1966 and November 1968, the Imperial Ethiopian Government (IEG) published a series of surveys based on samples of 26,121 households in twelve of the fourteen provinces viz. Tigre, Begemder, Wello, Gojjam, Shewa,[1] Wallega, Illubabor, Keffa, Gamu Gofa, Sidamo, Harerge and Arsi. The survey had a number of readily recognizable limitations. Owing to the small size of the samples, relative standard error of estimators are quite high ranging from 17.4% for area under cultivation for Gammu Gofa to 6.6% of the same for Tigre with 10% error as a median. Even for items covered in the survey, some vital aspects (rented out and in land size, land owned, cost of labour) are not reported. The sampling procedure while three staged in all cases (sub-district, sub-division and household) shows a problem of comparability; this was improved in the surveys conducted at a later period. Instead of the simple random sampling of sub-divisions, the first and second stage sampling were based on population size. Subsequent samples were selected on the basis of probabilities proportionate to population size. While this may have reduced the sampling

1. For the purpose of this study, it was sub-divided into North (sub-provinces of Jara, Menz and Yifat, Merhabete, Selale, Tegulet and Bulga) and South (Chebo & Gurage, Haikoch & Butajira, Jibat & Mecha, Kembatta, Menagesna,, Yerer and Kereyu) on the basis of hypothesized variations in agrarian system.

arising from the setting equal probability for different sized sub-divisions done in the earlier surveys, the use of estimates rather than surveys or census of population and the reliance on memory lisiting of households, are likely to have involved errors greater than those estimated by the standard error for each province.

The survey concentrated only on 'operated' land and thus does not have the total holdings of resident or absentee landlords. Even for operated lands, the results grouping of holding size is only for upto five hectares. The progressive inclusion of additional items has made it difficult to aggregate for all the provinces in such aspects as livestock ownership by status of tenure. Nevertheless, this is the only countrywide economic survey of farming households based as it is on estimators from samples on statistical criteria, (apart from aspects such as ownership of land by some researchers) (Gilkes: 1975; Ottaway: 1978); to date no integrated use of data has been made. With the approximation of the agrarian structures in Eritrea and Bale, not covered by the survey, these two areas sharing a similar physical, historical and agrarian system, the survey results were found to be useful to compare with the otherwise mainly qualitative information available on the agrarian history of Ethiopia.

Table A. 4.1 Average size of holding* by status of tenure in the southern provinces of Ethiopia (AGS 2&3)

# No	Region	Owners	Tenants	Part-tenants	All
1	2	3	4	5	6
1	Arsi	1.53	2.19	0.84	0.54
2	Gemu Gofa	0.48	0.58	0.84	0.54
3	Harerge	0.97	1.06	3.47	1.14
4	Illubabur	0.93	0.58	1.53	0.65
5	Keffa	0.69	1.02	1.22	0.90
6	Shoa	1.42	1.81	1.78	1.68
7	Sidamo	0.55	0.49	0.31	0.52
8	Wollega	1.31	1.07	1.13	1.17
9	Wello	0.99	0.82	1.03	0.97
10	Total	0.98	1.20	1.54	1.13

Source: IBRD Ethiopia: Agricultural Sector Survey, Land Tenure, Annex 12, Table 4

Table A. 4.2 Tenurial status of rural households in 1966

# No	AGS	Fully Owned	Fully Rented	Partly Rented	Landless	Total RHH
1	2	3	4	5	6	7
1	AGS 1	856,013	228,837	214,820	260,830	1,560,500
2	AGS 2	410,959	317,197	25,249	82,150	835,585
3	AGS 3	423,001	614,605	68,295	103,650	1,209,550
4	Total	1,689,973	1,160,639	308,364	446,660	3,605,635

Source: Compiled from CSO,IEG, A Report on the Survey of 12 Provinces, issued separately 1966-1968

* In all the data used in this chapter (CSO,IEG,1966-1968; CSO,PMGSE,1974 and PMGSE,1982), holdings* are less than actually cultivated land by 5-10% and the data for 1966 unless otherwise specified

Table A 4.3 % and cumulate % distribution of size of holdings

# No	Holding Size	Households			Hectarage		
		No	%	cum %	Ha	%	cum %
1	2	3	4	5	6	7	8
1	0	446,600	12.4	12.4			
2	0-1	2,108,827	58.4	70.8	935,331	25.6	25.6
3	1-3	866,699	24.1	94.9	1,473,336	40.3	65.9
4	3-5	130,973	3.6	98.5	498,706	13.6	79.5
5	(1-5)	(997,672)	(27.7)	(98.5)	(1,972,042)	(53.9)	(79.5)
6	>5	52,476	2.6	101.1	754,018	20.5	100.0
7	Total	3,605,635	101.1		3,658,391	100.0	

Source: compiled from CSO,IEG Reports on a Survey of 12 Provinces in Ethippia issued separately 1966-1968

Table A 4.4 Distribution of rural households in 1966

a) Rural households, holdings, acreage and number of fields by agrarian system

# No	AGS	RHH	Holdings	Ha	Fields	Fields/Ha
1	2	3	4	5	6	7
1	AGS 1	1,560,500	1,299,670	1,579,114	4,980,774	3.8
2	AGS 2	835,585	753,405	557,825	1,778,930	2.4
3	AGS 3	1,209,550	1,105,900	1,521,452	3,869,070	3.5
4	Total	3,605,636	3,158,975	3,658,391	10,682,774	3.4

b) Distribution of size of holdings by agrarian system

# No	AGS	0-1	1-3	3-5	(1-5)	>5	Total
1	2	3	4	5	6	7	8
1	AGS 1	829,691	406,987	52,847	459,834	10,145	1,299,670
2	AGS 2	657,795	86,588	18,496	105,084	3,759	766,637
3	AGS 3	621,341	373,124	59,630	432,754	38,572	1,092,668
4	Total	2,108,827	866,699	130,973	997,672	12,476	3,158,975

Table A. 4.5 Mode of payment of tenancy rent by agrarian system (%)

# No	AGS	Kind	Mode of Payment			
			Kind & Cash	Cash	Service	Total
1	2	3	4	5	6	7
1	AGS 1	81	4	11	4	100
2	AGS 2	26	6	65	3	100
3	AGS 3	56	5	37	2	100
4	Total	58	5	35	2	100

Source: Computed from CSO,IEG Report on a Survey of 12 Provinces, issued separately,1966-1968

Table A.4.6 The distribution of wage employment outside traditional agriculture, defence and security in 1970

Sector	Public	Private	Weighted Mean
Mechanised Agric.	0.9	20.4	13.6
Mining	2.8	0.4	1.1
Manufacturing		39.2	27.1
Construction	10.4	2.8	5.5
Electricity, Gas & Sanitary	1.9	0.3	0.7
Commerce	2.1	12.4	8.8
Transport & communications	10.5	3.8	6.2
Services	65.2	20.4	36.0
Total	100	100	100
No of Workers	95.5	176.9	272.4

Source: IEG, Ministry of National Community Development
A Survey of Occupation Patterns and Employment in Ethiopia, 1971 Quoted in Teketel Haile Marram,1973, p 20

Table A.4.7 Rural indebtedness in Ethiopia in 1966

a) Reasons for borrowing (%)

No	Item	Highest	Lowest	Average
1	2	3	4	5
1	Food	71.1 (AGS 1)	16.1 (AGS 2)	51
2	Clothing	11.1 (AGS 3)	4.1 (AGS 3)	8
3	Farming	11.2 (AGS 3)	0.3 (AGS 2)	4
4	Taxes	43.3 (AGS 2)	3.4 (AGS 1)	12
5	Other	NA	NA	25
6	Total			100

Source: CSO,PMGSE Indebtedness, Statistical Bulletin no 10, Addis Ababa, August,1974. Aggregated from data for individual provinces from various pages

b) Source of borrowing (%)

# No	Category	Highest	Lowest	Average
1	2	3	4	5
1	Own landlord	9 (AGS 3)	0.4 (AGS 1)	4
2	Trader	24 (AGS 2)	3 (AGS 1)	15
3	Landowner	59 (AGS 1)	27 (AGS 1)	42
4	Other	54 (AGS 2)	27 (AGS 1)	39
5	Total			100

Table A.4.7 c) Size of loans in Birr

# No 1	Category 2	Highest 3	Lowest 4	Average 5
1	< 30	79 (AGS 2)	6 (AGS 3)	54
2	31-100	65 (AGS 3)	18 (AGS 2)	37
3	> 100	29 (AGS 3)	3 (AGS 1)	9
4	Total			100

d) % of households indebted by status and tenure

# No 1	Category 2	Highest 3	Lowest 4	Average 5
1	Owners	62 (AGS 3)	20 (AGS 2)	36
2	Tenants	48 (AGS 3)	16 (AGS 2)	25
3	Part-tenants	NA		
4	Total	55	26 (AGS 3)	36

Source: Compiled from CSO, PMGSE Indebtedness, Addis Ababa, August,1974

Table A.4.8 Rural indebtedness, size of holdings and ownership of oxen in 8 Provinces

a) Distribution of (%) of rural indebtedness (y_i) and percentage of holdings with less than ½ hectare and one oxen or less

# No	Region	Hldgs in Sample	Indebted % (y_i)	% of Hldgs <½ Ha (x_2)	% of Hldgs < 1 ox (x_1)
1	2	3	4	5	6
1	Tigre	1,558	36.1	45	36.8
2	Oegemder	2,464	33.8	55	40.8
3	Wello	2,348	45.7	40	71.8
4	Wollega	2,035	22.8	29	30.8
5	Illubabur	2,427	29.8	32	39.6
6	Keffa	3,315	36.2	43	47.5
7	Gamu Gofa	1,370	33.7	60	43.4
8	Harerge	2,950	34.7	55	49.8
	Total	18,467	34.3	46	46.0

b) Result of a regression equation with % of indebtedness of rural households as a dependant variable (y_i) and % of households with less than 1 ox (x_1) and ½ a hectare of holding (x_2)

$$y_i = bo + b_1x_1 + b_2x_2$$

$$= 12.9 + 0.45 + 0.02x_2$$

$$(10.5)\ (o.17)\ (0.18)$$

$\bar{y} = 34.1$
$\bar{x}_1 = 45.1$
$\bar{x}_2 = 45.0$
to 005(d.f.s.) = 2.015
$R^2yx_1x_2 = 0.77$
$\mu = 8$

Source: CSO,IEG, Report on a survey of 12 Provinces issued separately, 1966-1968, Addis Abeba.

Table A.4.9 Maximum, modal and minimum sizes of land in individual ownership in 10 regions of Ethiopia in 1970

# No	Region	Max Ha	Modal Ha	Min Ha	Absentee LL % share	
					No	Ha
1	2	3	4	5	6	7
1	Arussi	2,600	40	2.4	28	27
2	Bale	4,642	80	1.2	15	12
3	Femu Gofa	2,000	40	5.2	10	42
4	Harerge	61,400	40	4.8	23	48
5	Illubabar	16,200	40	4.8	42	42
6	Keffa	9,160	40	0.4	18	34
7	Shoa	20,160	40	0.8	35	45
8	Sidamo	9,600	40	4.0	25	42
9	Wellega	3,320	40	4.8	29	28
10	Welo	4,000	40	0.8	26	13

LL= Land Lord

Source: IBRD Ethiopia: Agriculture Sector Survey, Washington,1973, Annex 12, table 3.4, Survey of 12 provinces

Table A.4.10 Number of owners and total hectares by size of ownership in Harerge Province

# No	Ownership Size Ha	Owners			Owned Land		
		No	%	Cum %	Ha	%	Cum %
1	2	3	4	5	6	7	8
1	< 40	11,133	44.3	44.3	279,502	16.7	16.7
2	40-120	1,131	53.6	97.9	106,970	6.4	23.1
3	121-360	206	1.7	99.6	40,510	2.4	25.5
4	361-600	32	0.3	99.9	15,400	0.9	26.4
5	> 600	25	0.2	101.1	1,245,915	74.5	99.9
6	Total	12,527	100.1		1,671,027		

Source: Sileshi Wolde-Badik, Land Ownership in Harerge Province, IEG, Eth. College of Agric and Mechanical Arts, Experiment Station Bulletin, No 47, 1966

Table A.4.11 Ratio of tenancy rent from gross output by supply of means of production (land only and land and oxen) in 6 regions in Ethiopia in 1966

# No	Oxen by	Tenancy Rate		
		Up to 50%	>50%	Total
1.	Landlord	55.2	44.8	100
2.	Tenant	78.1	11.9	100
3.	Total	74.7	25.3	100
4.	No of cases	502,751	170,177	672,928

Source: Survey of Various Provinces:1966-1968,

Table A.4.12 Ethiopia: Distribution of GDP by origin at current factor cost 1961/62 - 1976/77

# No	Year	Agric	Indust	mfg	Bldg & Constr	Defence & Pub Admin
1	2	3	4	5	6	7
1	1961/62	65	12	2	6	4
2	62/63	63	13	2	6	5
3	64/64	61	13	3	6	4
4	64/65	58	14	3	6	5
5	65/66	57	15	3	6	5
6	66/67	56	16	4	6	5
7	67/68	56	16	5	6	5
8	68/69	56	16	5	6	6
9	69/70	56	14	4	5	6
10	70/71	55	15	5	5	5
11	71/72	52	16	5	5	6
12	72/73	51	16	5	5	6
13	73/74	51	16	5	5	6
14	74/75	48	17	6	5	7
15	75/76	50	15	6	3	7
16	76/77	52	15	6	3	7

Source: PMGSE, Data Book on Land Use and Agriculture in Ethiopia, Vol. II 1982; p. 386-387.

Table A.4.13 Imports of grain into Ethiopia in 1964-1975('000 tons)

Year	Wheat	Rice	Wheat Flour	All Cereal
1964		1.7	6.5	9.4
65	6.6	1.6	13.9	24.3
66	8.3	7.6	28.6	50.2
67	0.1	1.2	20.9	27.7
68	Insign	1.0	16.1	19.6
69	4.4	1.5	17.6	25.8
70	31.5	1.5	28.8	66.3
71	34.1	1.3	8.3	44.9
72	5.1	1.1	Insign	9.2
73	11.8	0.3	"	17.9
74	1.0	0.5	"	4.5
75	Insign	0.1	"	1.3

Insign = insignificant (<0.1)

Source: PMGSE, Data Book on Land Use and Agriculture in Ethiopia, vol i, p 43

Table A. 4.14 Ethiopian foreign trade and the share of agricultural commodities in 1966 - 1970

a) Exports in mill of birr

		1966	1967	1968	1969	1970
1	Total Expts	288.6	250.0	258.1	292.6	294.6
2	Agric Commodities	279.3 (97)	246.5 (98)	252.5 (98)	282.7 (96)	286.0 (97)
3	Coffee	188.2	139.2	153.0	173.9	181.3

( ) % of total

b) Imports in mill of birr

	1966	1967	1968	1969	1970
Total impts	404.2	357.4	432.5	388.3	429.2
Agric Commodities	48.8	39.8	38.8	36.3	41.4
Cereals	4.5	1.9	1.0	2.1	8.6
Agric inputs	11.2	9.0	9.5	10.7	12.2

Source: IBRD, Ethiopia: Agricultural Sector Survey, Washington, 1973
Statistical Annex 13, Tables 1, 6, 4 1 9

Table A. 4.15 Sources of government current revenue in Ethiopia 1963/64 - 1970/71 (in mill of birr)

# No	Source of Revenue	63/64	67/68	68/69	69/70	70/71
1	Total Revenue	236	315	337	376	428
2	1.1 Direct Tax	57	77	98	102	122
3	1.1.1 Land & cattle	26	17	19	20	26
4	1.2 Excise Tax	37	80	87	96	102
5	1.3 General Sales	8	20	24	25	30
6	1.4 Tax on Imports	108	112	105	113	119
7	1.5 Tax on Exports	26	26	23	39	36
8	% from agric I	22	14	13	16	14
9	% from agric II	68	49	44	46	43

I = direct = 1.1.1 + 1.5

II = indirect = 1.1.1 + 1.4 + 1.5

Source: IBRD 1973, Annex 13, Table 1

Table A 4.16 Disbursement of foreign loans by sector 1962-1971 (in mill of birr)

# No	Sector	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Total
1	2	3	4	5	6	7	8	9	10	11	12	14
1	Total	69	53	23	57	78	53	88	69	69	109	668
2	Infras	63	34	15	36	56	32	49	31	21	65	402
3	Indus	3	12	5	16	9	11	12	4	6	5	83
4	Agric		0.4	0.1	0.2	0.2	0.5	NA	NA	0.7	22.3	24
5	Health		0.3	0.6	1.2	1.2	40	15	21	10	8	60
6	Other	2	6	2	4	11	4	9	8	29	8	83

Source: IBRD Ethiopia: Agricultural Sector Survey, Washington,1973
Vol 1, Statistical Annex, Table 26

Table 4.17 The Addis Ababa and regional retail price levels,1966-1971

# No	Market Centre	Mixed Wheat	Brown Teff	Barley	ARPI		
					Total	Clothing	Cereals
1	2	3	4	5	6	7	8
1	Addis Ababa	2.6	1.0	2.2	2.3	2.1	3.2
2	Dessie	3.4	1.8	1.8			
3	Dire Dawa	2.7	2.7	4.6			
4	Bahr Dar	1.6	1.2	NA			
5	Djimma	0.4	5.6	1.6			

ARPI = Addis Ababa retail price index

Source: IBRD, Ethiopia: Agricultural Sector Survey:1973, Washington,1973
Statistical Annex, Table 25

CHAPTER THREE

3.1 INTRODUCTION

Capitalist agriculture in the production of cotton and sugar was confined to the irrigated valley of the Awash with seasonal migrant labour from agrarian systems 1 and 2. We also pointed out the problem for accumulation arising from the tributary position of the dominant class and the extreme poverty of over 90% of the peasantry.

Rather than land, we suggested oxen as a better analytical tool to identify the process of the social differentiation within the peasantry. We rejected and demonstrated the weakness of the North-South and tenant/owner dichotomy in understanding the pre-1975 agrarian structure.

Since the mid-sixties and the introduction of the new technology, however, changes in the mode of agricultural production initiated by the new technology inputs began to change the forces and the tributary relations of production in agriculture. New social class from above "agrarian capitalist" and below "peasant bourgeoisie" were in the making, a process halted by the February 1974 Revolution. While we examine this specific process in Arsi in chapter six and in Ethiopia as a whole in chapter seven, this chapter

presents an empirical farm level investigation into the pattern and basis of the social differentiation of the peasantry as formulated by Lenin and Chayanov. This is seen in the context of pre and post new technology use of factor inputs (particularly focusing on factor inputs and outputs in peasant farms which have important empirical implications on development strategy in the context of agrarian change in poor countries). Following this introduction, section two provides a discussion of the Chayanovian model of a peasant economy and recent theoretical and empirical contributions. Section three introduces the farm management data which are the basis of the empirical results and the analytical model developed. Section four lists the Chayanovian hypothesis into a measurable format* and presents the results of the data in Chilalo. Section five recasts the basis of social differentiation and the final section provides a summary.

* See Appendix 5.3 Chapter five for the actual statements of Chayanov and the two way table analysis of his data.

3.2 THE CHAYANOVIAN MODEL:[1]

The central proposition of the Chayanovian hypothesis is that variations in the level of family income between peasant households is mainly, though not exclusively (as we shall see later), explained by the size and composition of the family. His demographic rather than socio-economic differentiation schema rests on his fundamental assertion that the family is a self-contained enterprise with its consumption demand originating not in the market but from its own farm through the supply of family labour. For Chayanov,

> "In the scheme of harmoniously developed organic elements of the labour farm undertaking the labour force of the family is something given and the farm's production elements are fixed in accordance with it in the technical harmony usual among them. Given freedom to acquire the necessary area of land for use and the possibility of having available the necessary means of production, peasant farms are structured to conform to the optimal degree of self exploitation of the family labour force and in a technically optimal system of production factors as regards their size and relationship of the parts". (Chayanov: 1966, p. 89).

Within this broad framework, a cross section of families with the same population size have different age composition and therefore varying family aggregate consumption demand and labour supply. On the basis of age, family members are categorized as consumption and labour (worker) units. The productivities of labour, capital and land are equilibrating mechanisms in the satisfaction of family consumer demand and the drudgery of labour. Technological

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1. A systematic synthesis, a careful restatement and formalization of the core of the model and a reorganization of the main farm management data that Chayanov marshalled to test his hypothesis have been undertaken in a series of works by Harrison (Harrison: 75, 76/77 & 77).

change and capital accumulation are taken mainly as contributing towards the alleviation of the drudgery of labour. The assumption of a culturally defined consumer demand[2] and its cost, the drudgery of labour to attain it, forms the core of the Chayanovian model against Lenin's observation of the Russian peasantry where "the disintegration of the peasantry creates a home market for capitalism by converting the peasant into a farm worker on the one hand, and into a small commodity producer, a petty bourgeoisie on the other". (Lenin: 1964 p. 151). Whereas Lenin emphasized the transformation of the peasantry into a rural proletariat creating a market for articles of consumption on the one hand and its transformation into a rural bourgeoisie expanding the market for the means of production, Chayanov's and later Shanin's schema (Chayanov: 1966; Shanin: 1973,) on the other envisage a cyclical mobility of the peasantry mainly regulated by a demographic transition altering the age and size composition of the peasant households. [3]

Harrison formalizes Chayanov's model as a special case of the backward bending supply curve of the Neopopulist alternative to the simple allocation Neo classical models. He works out the logical deductions for the long run spatial and size distribution of farms and incomes counterposed on changes in technology and the demographic cycle of the

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2. This has been somewhat relaxed in a later work to take into account the acquisition of new tastes by the peasantry (Harrison: 1975).

3. The specific Populist and Neopopulist strands of arguments regarding land, labour and capital productivity in peasant agriculture is summarised in section 3 prior to the actual modelling of the Chayanovian thesis in the case of the Chilalo peasant.

peasant household. Relaxing the perfectly inelastic supply curve of labour to take into account the increasing drudgery of labour and therefore the inequality of per capita income with households of different dependency ratios, according to Harrison, Chayanov's model explains inequalities of income and land per head "...on the changing family composition, measured by the dependency ratio which rose and fell through the family cycle. In consequence, inequality itself was neither reversible nor irreversible, but cyclical". (Harrison: 1975, p.399).

In his earlier concise summary, Harrison criticizes Chayanov's "unfortunate assumptions" - i) diminishing returns to fixed resources, ii) the idealization of a peasant mode of production as more appropriate, more efficient and more competitive and without exploitation and iii) the inelasticity of product and factor markets. Chayanov's inference of cooperatives as the best institutional framework for agricultural development is also an "unjustified inference" as state farms and private farms could equally serve similar purposes. He further criticizes it for its static allocative decisions, its weakness as a predictive model and its inability to explain the process of capital formation as peasant households move in the demographic cycle.

Of its relevance to a macro theory of development, Harrison acknowledges that Chayanov's model was based on a real phenomena of underdevelopment - low rates of consumption and saving, and the prevalence of unemployed labour power. However, it failed to be a theory of underdevelopment itself, of the origins of these phenomena, and of the relations between farms and regions as a whole. He questions the validity of the empirical data as it was based on "....

fictitious averages and marginal irregularities rather than systematic tendencies" (Harrison: 1977, p. 141). His own alternative formulation, however is akin to that of Myrdal's (Myrdal: 1976 p. 693) circular causation when he (Harrison: 1975; p. 406) says that

> "....different regions - and different farms - have different histories, which means that they start out relatively rich or poor. Those different histories interact, which means that small farms are poor because large farms set the prices which constrain small farm growth. Similarly, advanced regions engage in inter-regional and international trade at prices which causes backward regions to underdevelop".

Price constraints[4] set by large farms in factor and product markets, minimum consumption requirement on the one hand and the difficulties in substituting labour for capital on the other are said to prohibit the full e mployment of peasant labour in small farms.

Probably the first non-Russian empirical testing of the Chayanovian hypothesis was in Kenya. The study was limited to its static resource allocation aspects within the peasant households and the determinants of income (Hunt: 1979). The Mbere district from where the empirical data was collected was described as stony or rocky with no underground water supply. As a result of or because of this, there was an almost free supply of land. Coupled with the low peasant technology (hand cultivated using hoes and sticks), it may be said to be a potential area par excellence for the reproduction of an undifferentiated peasantry and to capture many of the Chayanovian formulations. However,

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4. The specific way in which this works out in the process of differentiation is not however, spelt out.

although "the prime objective of all farmers is to achieve as nearly as possible, in the face of a hostile environment, self-sufficiency in basic foodstuffs", (Hunt:1979, p.257), of the 10 propositions[5] set out (8 of whilch dealt with strictly static resource allocations and two with the extent of the peasants link with the national economy), three were found to be significant, while four were not. Three others involved problems of testing (Hunt: 1979). A significant and positive correlation between cultivated land and consumer unit, labour input per labour unit with consumer worker ratio, and per capita income with capital (fixed and working) were reported.

However, the three basic tenets of the Chayanovian hypothesis of resource allocation (Chayanov: 1966, pp.78-80) which have important implications for a structural transformation of the peasant economy - falling rate of labour input with a rise in per capita income - a backward bending supply curve of labour, higher gross income per labour unit with increasing consumer labour ratio (to meet the consumption demand of a higher dependency ratio) and a tendency towards a ceiling for accumulation could not be verified in the Kenyan case. Although a positive association existed between the consumer worker ratio and the input of labour per available labour unit, this was not translated into an income

5. The propositions
/Returns to labour and family size, labour input per annum and producer consumer ratio, producer consumer ratio and per capita ilncome, producer(worker) and output per worker, marginal utility of output and disutility of work, farm price response and peasant farming, per capita income and total labour supply, per capita income and capital labour ratio; and peasant production and national price (product and factor) price formation.

relationship between households, as peasants with higher levels of income were those with higher levels of education which gave rise to remunerative farm incomes from off-farm work. Despite the almost 'free' availability of land and the relatively low level of technology used by the peasantry, the two main indexes of peasant differentiation - hiring in and hiring out of labour, significant variations in levels of fixed and working capital - were reported.

In the following sections, we attempt to test the Chayanovian hypothesis counterposed with the Leninist exposition of the process of peasant differentiation undertaken in subsequent chapters. Particular focus is given to Chayanov's deductions and empirical presentation on land productivity, labour supply[6], the role of capital in the peasant farm and associated income variation which have important policy implications in the context of the new technology in Chilalo to be discussed in later chapters. In comparison to the non-Russian empirical testing of the Chayanovian hypothesis (Hunt: 1977; Rahman: 1983), Chilalo had a relatively elastic supply of temperate, fertile/cultivable land. With the plough culture which gradually replaced grazing over most of Arsiland (in which Chilalo is found), it appears that the agricultural landscape has more in common with the Russian rural scene at the time of Chayanov's study. While the analysis here is based only on cross-sectional data[7], a similarly designed farm management data for before and after the technology, has made possible a comparative study.

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6. Supply of land is fully discussed under agrarian structure in Chilalo in the next chapter.

7. Ideally both cross-sectional and temporal data would have added more rigour to the analysis.

3.3 THE FARM MANAGEMENT DATA AND ANALYTICAL METHOD USED.

The four villages - Dighellu, Yeloma (hereafter villages 1 and 2), Assela and Assassa (villages 3 and 4)-the farm management data which are used to test the Chayanovian hypothesis, were selected in three varying locations among the sedentary farmers of the highlands of Chilalo sub-province[8] (Dighellu and Yelama were in close proximity and the data was collected and published together) (CADU 1967, 1972, 1976). Dighelu and Yeloma were baseline studies undertaken in 1967. The other two (Assela and Assassa) were studied during 1970/71 after the new technology had been widely disseminated.[9] The studies were among a series of very numerous agronomic, social and economic surveys and serials (annual plans, annual reports, crop sampling surveys, results of trials) undertaken by the project as a baseline, ongoing and evaluation reports.[10]

In view of the initial need to obtain the cooperation of the farming households, rather than using

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8. The agrarian structure of Southern Ethiopia and of Chilalo Awraja are more extensively discussed in chapters 2 and 4. The process of transition from grazing to sedentarization is reconstructed from oral tradition and living elders by Lexander (CADU;1968).

9. Product and factor prices have been adjusted for levels as the 1970/71 prices

10. From the project preparation period in 1966 to 1982 the project published 137 reports and studies on various socio-economic, agronomic aspects of the Chilalo sub-province and the Arsi Region.

sampling methods, the subjects of the farm management data were selected for their representativeness from a list of cooperating farmers. On the basis of the size of holdings, the peasant households selected for the study from the four villages fall within a broad range of similar groupings for Arsi as a whole (chapter 6 Table 41).

Table 1: Distribution of size of Holdings in the case farms and Chilalo.

Sl. No.	Hold. Size (ha)	Vill 1&2		Vill 3&4		All Vill.		All Chilalo
		No.	cum %	No.	Cum %	No.	Cum %	Cum %
1	2	3	4	5	6	7	8	
1	0-2	3	30	2	10	5	17	36
2	2-4	2	50	8	50	10	50	68
3	4-6	5	100	7	15	12	90	100
4	6-8			1	90	1	93	
5	8-10							
6	> 10			2	100	2	100	

Sources: CADU: 1967,1972 and 1976:Table 6.1

The periodic collection of the farm management data was preceded by a complete inventory. Every week an extension agent recorded details of the household's transactions, changes in stock etc. Considering the immense economic advantage the CADU project conferred on the seed/fertilizer package participants, the high motivation of its extension staff[11] and the selection of farmers who were judged to be "cooperative" from the very outset, there is no special reason to suspect that the data may be of inferior quality by the standard of data collection in poor countries. [12]

11 In a comparative survey of rural development projects in Africa, Uma Lele finds the CADU project staff as the most motivated and development goal oriented (Lele: 1975, p.135).

12. For problems, quality and methods of data collection in poor countries, see Lipton, M. and M. Moore. The Methodology of Village Study in Less Developed Countries, University of Sussex, 1972.

The farm management resource and output data were aggregated in a manner to be suitable for modelling the hypothesis testing. The household demographic data, livestock and farm labour supply and input (adults and children on the one hand, males and females on the other) were classified into uniform units.[13] Aggregated labour inputs were subdivided into labour in crops(LACR), labour in animals (LAAN) and total labour (LATO). Purchased working capital inputs have been computed separately as hired labour (HIREDLA), fertilizer (FERT), seed (SEED), machine hire (MACHIRE) and others (OTHER). These were aggregated under total farm expense (TAFAEXP) - exclusive of family labour and other inputs originating from the farm itself. Total cash expense (TACAEXP) has been derived together from TOFAEXP, taxes, rent in cash and purchased consumption goods.

13

SL NO	AGE IN YRS	CU*		LU	
		M	F	M	F
1	2	3	4	5	6
2	0-1	0-3	0-3	YRS 20-50=1	
3	2-3	0.4	0.4	YRS 15-20	20-50=0.75
4	4-6	0.5	0.5	50-60	
5	7-8	0.7	0.7		
6	9-10	0.8	0.8	YRS 10-15	10-20=0.50
7	11-12	0.83	0.83	YRS >60	>50
8	13-15	1.0	0.83		
9	16-19	1.2	0.83		
10	20	1.0	0.83		

CU=Consumption Unit

LU=Labour Unit

Labour hours converted to man-days according to columns 4 & 5; 6 hours was taken as a man-day.

For livestock unit:
Cows 1 < 2yrs=0.5
Oxen 1 < 2yrs=0.5
Horses/Mules
1 < 3yrs=0.5
Sheep/Goats 0.2
Donkeys 0.5

* Adapted from Ethiopian National Institute by (CADU, 1969 p.51)

On the output side, gross income from crops (GIC), gross income from animals (GIA) were obtained by imputing product prices at 1967 levels for consumed farm output and gross cash incomes from crops (GCIC) and animals (GCIA) adjusted to 1967 prices . Total gross incomes (TOGI) included other incomes (OTHR) and miscellaneous incomes (MISCGI). Net cash incomes (NCI), net cash income from crops (NCICR) were derived from the respective gross cash incomes less TOFAEXP. Total net farm incomes were obtained through total gross incomes (TOGI) less farm expenses (TOFAEXP) - (TONFI1) and total farm expenses and imputed costs of family labour (TONFI2). Gross incomes (GI), gross cash incomes from crops and animals (GIANCR - gross marketed surplus) net cash incomes from farming (NMS - net marketed surplus) and net farm incomes were computed from animals and crops separately and together with non-farm incomes. For each of income, income per labour unit (GICLU, GCIANCRLU ....) per consumer unit (GICCU, GCICCU, NCICRCU...), per hectare (GICRC, NFICRC, NCICRC...), per man-days worked were calculated . The analysis, however, has been limited to only crop incomes and inputs in crop production both to bring the analysis to size on the one hand and to make the model more comprehensive with the more complete data available for crops on the other. In order to test the Chayanovian hypothesis,[14] a simple statistical model -

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14. The other variables and other models are used in subsequent chapters in the exposition of the actual differentiation of the Chilalo peasantry and the new technology.

the partial correlation coefficient was used.[15] Four models of resource input were correlated with total incomes from crops (GIC) per capita income (GICCU), return to labour per labour unit (GICLU), return to labour per labour day (GICLACR), productivity of land (gross incomes from crops per hectare - GICRC and net incomes from crops per hectare -GICRC and net incomes from crops per hectare NFICRC) and the productivity of capital. The income/productivity variables are :-

1.0 Incomes from crops/ GIC, GICCU

1.1 Gross income from crops (GIC)

1.2 Gross income from crops per consumer unit (GICCU =GIC/CU, CU= consumer unit)

2.0 Per capita return to labour / GICLU, GICLACR

2.1 Gross income from crops per labour unit (GICLU= GIC/LU, LU =labour unit

2.2 Gross income from crops per labour day (GICLACR= GIC/LACR, LACR=labour in crops)

3.0 Productivity of land / GICRC, NFICRC

3.1 Gross income from crop per hectare of cultivated land (GICRC=GIC/C, C=cultivated land)

3.2 Net farm income from crop per hectare of cultivated land (NFICRC= NFICR/C)

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15. Chayanov employed two way cross tabulations without differentiating the joint and independent correlations in his variables or a measure of their statistical significance (Patnaik: 1979). The partial correlation model, its uses and problems is neatly summarized in Statistical Packages for Social Sciences (SPPS) Second edition McGraw-Hill 1975, pp.301-319. This statistical technique was used for:
a) its simplicity
b) the possibility of statistical control of variables within the model
c) when no actual magnitude of relationship is required there is the least distortion of relationships due to the form of functional relationship selected
d) the convenience of analysis with fewer degrees of freedom as in the cases of villages 1 & 2 (see attached level of significance table in A.5.1).

4.0 Productivity of Capital[16] /PKGIC, PKGIC1, PKGIC2

4.1 Productivity of oxen (PKGIC=$\frac{GIC}{VOX}$ x100,

VOX=value of ox)

4.2 Productivity of purchased working capital-TOFAEXP (PKGIC1=$\frac{GIC}{TOFAEXP}$ x100)

4.3 Productivity of total capital - oxen + working capital PKGIC2 ($\frac{GIC}{K}$ x 100, K=VOX+TOFAEXP)

The four resource models consist of:-

1. C/OX/CULU/CU/LU model. Land cultivated (C), capital (OX), labour (LU) together with consumer units (CU) and consumer labour ratio (CULU). Apart from land cultivated, while these are the total potential resource supply, a second model was used to correlate elements of output and productivity with actual resource input used by the peasant household thus:

2. C/K/TOFAEXP/LACR model. Land cultivated (C), capital (K)[17] , labour in crops (LACR), and working capital (TOFAEXP). The latter mainly consisting of inputs in the form of fertilizer and to a lesser extent seed, hired labour and machine hire was especially important to compare villages with and wi thout the new technology inputs.

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16. Derived from the productivity of capital in peasant farm used by Chayanov (Chayanov: 1966 p.98) and expanded to separately examine items of farm capital and their correlations with incomes. Value of Ox from Ellis, G. Man or Machine:Beast or Burden: A Case Study of the Economics of Agricultural Mechanisation in Ada District, Ethiopia. Ph.D. Thesis, University of Tennesee 1972, p.96.

17. Value of ox and working capital.

Both inputs in the above models were transformed to a per hectare basis (divided by C) to analyze the effect of the deepening of capital & labour input on productivity as per the Chayanovian hypothesis[18] which may be considered as models 3 and 4.

3 C/OXENC/CULU/CUC/LUC

4 C/KC/TOFAEXPC/LACRHE

The analysis was carried out on the basis of the villages without the new technology (Dighellu and Yeloma, villages 1 and 2), and those using the technology (Assala and Assassa - villages 3 and 4). All the four villages were further sub-divided by holding size - those greater than and less than four hectares.[19] The SPSS partial correlation coefficient model output provides correlation with all possible combinations and controls for variables in the model. The main Chayanovian hypotheses were tested directly.[20] We also recast his model in the presentation of the alternative model to Chayanov in order to understand the relationship between resources, income and productivity. We have selected the relevant coefficients between income/productivity and resources when all the other resources in the particular model are controlled (AC); the highest coefficient for two variables in the model (H) and the lowest (L). (See Appendix for levels of significance).

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18. The results are summarized in section 4. for models i and 2

19. The holding size of four was selected because it is a median size sub-dividing the peasant households into two of 15 each.

20. As per the formulations by Chayanov.

3.4. THE CHAYANOVIAN HYPOTHESIS AND THE EMPIRICAL EVIDENCE FROM CHILALO.

First let us summarize the main Chayanovian propositions,[21] their logical deductions on the basis of which he analysed the statistical data to validate his model.

1. With a constant level of labour unit (LU) as the number of consumption units (CU) increases gross income (GIC) also increases. On the other hand, with consumption demand held constant (CU) a rise in labour units leads to a rise in gross income only up to a limit (p.78).

$$\overline{LU},\ \uparrow CU \Rightarrow \uparrow GIC,\ (\overline{LU},\ \uparrow CU \Rightarrow \uparrow GIC) > (\overline{CU},\ \uparrow LU \Rightarrow \uparrow GIC)$$

This is so because faced with a higher consumption demand in relation to their labour supply, workers in families with a higher consumer worker ratio (CULU) are forced to increase their per annum labour input (working for longer hours by increasing the drudgery of labour and to a lesser extent by augmenting labour with more land and capital). Thus we have another important Chayanovian hypothesis.

2. As the consumer worker ratio (CULU) increases gross income per labour unit (GICLU) increases (p.78). (Assuming constant return to labour per working day).

$$\uparrow CULU \Rightarrow \uparrow GICLU$$

Within this broad framework, he introduces variations in other inputs with labour-land and capital.

3. With a constant land labour ratio ($\overline{LUC}$), a rise in consumer worker ratio(CULU), leads to a rise in income

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21. We have selected those whi ı Chayanov dealt with in his statistical analysis to the exclusion of his macro formulations.

per labour unit (GICLU). And perhaps more obviously also an increase in the land labour ratio when the consumer worker ratio is held constant, leads to an increase in income per labour unit. (p.79)

$\overline{LUC}$, $\uparrow CULU \Rightarrow \uparrow GICLU$

$\overline{CULU}$, $\downarrow LUC \Rightarrow \uparrow GICLU$ [22]

Higher land labour ratio (or lower labour land ratio) positively correlates not only with higher levels of income per labour unit, but also with higher income per consumer unit (GICCU). Thus:

4. With constant consumer worker ratio (CULU), a rise in land labour ratio (a fall in labour land ratio) leads to an increase in income per consumer unit (GICCU) p. 79

$\overline{CULU}$, $\downarrow LUC \Rightarrow \uparrow GICCU$ and less significantly

$\overline{LUC}$, $\uparrow CULU \Rightarrow \uparrow GICCU$.

5. Similarly, a positive correlation is demonstrated between land consumer ratio on the one hand and income per consumer and labour unit on the other.

$\downarrow CUC \Rightarrow \uparrow GIC$

$\downarrow CUC \Rightarrow \uparrow GICCU$

$\downarrow CUC \Rightarrow \uparrow GICLU$

Proposition 5 implies a tendency towards variations of incomes based on increased cultivated land per consumer unit - the land increase offsetting any possible fall in labour productivity. In the Chayanovian formulation this goes only to a certain level as it is held back by the increasing drudgery of labour with its use over increased cultivated land as also by the declining rate of return from land as its size increases (p.196). This limit is set out as:

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22. The converse of land labour ratio.

6. As income per labour day increases (GICLACR), the supply of labour (LACR) decreases (backward bending supply curve) p.80

$$\uparrow \text{GICLACR} \Rightarrow \downarrow \text{LACR}$$ [23]

He further examines the role of capital in the peasant farm. A number of his more obvious propositions could be put together.

7. With constant labour unit, increase in capital is positively correlated with the size of cultivated land (C), cultivated land per labour unit, gross income (GIC), net incomes per consumer unit (NFICRCU) and income per labour unit (GICLU)) p.96

$\overline{\text{LU}}$, $\uparrow$ K$\Rightarrow\uparrow$C, $\uparrow$C/LU(or$\downarrow$LUC), $\uparrow$GIC, $\uparrow$NFICRCU, $\uparrow$GICLU

Perhaps more obviously, he also demonstrated:

8. With constant capital ($\overline{\text{K}}$), rise in labour unit results in a fall in land labour ratio (or a rise in labour land ratio - LUC), net farm income per consumption unit (NFICRCU) and gross income per labour unit (GICLU) (pp.96-98).

i) $\overline{\text{K}}$, $\uparrow$LU$\Rightarrow\downarrow$C/LU ($\uparrow$LUC)$\Rightarrow\downarrow$NFICRCU, $\downarrow$GICLU

ii) $\overline{\text{LU}}$, $\uparrow$K$\Rightarrow\uparrow$C/LU ($\downarrow$LUC)$\Rightarrow\uparrow$NFICRU, $\uparrow$GICLU

iii) (ΔLU$\Rightarrow\Delta$C/LU$\Rightarrow\Delta$NFICRU, ΔGICLU)$>$(ΔK$\Rightarrow\Delta$C/LU$\Rightarrow$ ΔNFICRU, ΔGICLU)

Similarly for the specific situation of Chilalo, Chayanov's concept of capital in the peasant farm has been adapted and formulated in section 3 of this chapter.

9. When labour unit is held constant, an increase in capital leads to a decreasing return to capital (fall

23. Harrison (Harrison 1975) formally demonstrates the implication of these propositions.

in the productivity of capital) and land capital ratio. Thus:

$$\overline{LU},\ \uparrow K \not\Rightarrow \downarrow PKGIC,\ \downarrow C/K$$

More importantly he formulates that :

10. An increase in labour unit despite a constant level of capital, is positively correlated with increasing productivity of capital and land capital ratio because of the increasing consumer demand and the more intensive application of labour.

$$\overline{K},\ \uparrow LU \Rightarrow \uparrow PKGIC,\ \uparrow C/K$$

Even though his formulation admits a positive correlation between capital labour ratio and gross incomes, it is firmly argued that an increase in labour unit (capital labour ratio held constant) is more strongly positively correlated to income than an increase in capital labour ratio (with labour unit held constant)p.99.

11. $(\overline{K/LU},\ \uparrow LU \Rightarrow \uparrow GIC) > (\overline{LU},\ \uparrow K/LU \Rightarrow \uparrow GIC)$

In the following series of tables, we directly test the Chayanovian formulations from the 30 peasant households in Chilalo - with a further breakdown between those which did not adopt the new technology (villages 1 and 2), those which adopted (villages 3 and 4) and regrouping all on the basis of peasant strata - poor and lower middle on the one hand and upper middle and rich peasants on the other.

Table 2 Gross Income and Consumer Units

Hypothesis 1a Gross Income (GIC) is positively correlated with consumer units (CU) in peasant households. ($\uparrow$CU$\Rightarrow\uparrow$GIC)

SL NO	Operational Unit	AC	PCC			Highest		Lowest	
			$\overline{OX}$	$\overline{C}$	$\overline{OX}$, $\overline{C}$	PCC	VARS	PCC	VARS
1	2	3	4	5	6	7	8	9	10
1	Villages 1&2	09	26	13	10	46	OX	$\overline{44}$	$\overline{C}$
2	Villages 3&4	$\overline{09}$	09	29	01	29	$\overline{C}$	$\overline{23}$	C, OX
3	< 4 Ha	30	32	53*	22	59*	$\overline{CULU}$	15	CULU
4	>4 Ha	$\overline{11}$	11	42*	35	54*	CULU	$\overline{18}$	OX
5	All	11	18	22	12	30*	CULU	$\overline{03}$	LU

AC = when all variables are controlled

PCC = Partial correlation coefficient

Vars = variables

bars - X, C etc refer to controlled variables when they are on the heading column and negative in actual correlation coefficient result measures.[23a] ie. 09, 11 etc.

* Significant at 5% level.

Positive though insignificant correlation exists for the new technology villages when consumer unit is considered with oxen and cultivated land; when the latter 2 are controlled, the coefficients are insignificant even for these two cases (columns 4-6).

23a. For convenience in summarizing the result and economy of presentation, rather than having highest/lowest for negative and positive correlations, we have used positive correlations as point of reference. Hence even high negative correlations are considered as lowest which strictly is not the case.

Hypothesis 1b Gross Income (GIC) is positively correlated with consumer labour ratio (CULU)

($\uparrow$CULU$\Rightarrow\uparrow$GIC)

Table 3 Consumer worker ratio and gross incomes.

SL NO	Operational Unit	AC	PCC			Highest		Lowest	
			$\overline{OX}$	$\overline{C}$	$\overline{OX}$, $\overline{C}$	PCC	VARS	PCC	VARS
1	2	3	4	5	6	7	8	9	10
1	Villages 1&2	02	31	$\overline{06}$	$\overline{38}$	42	OX	$\overline{38}$	LU, CULU
2	Villages 3&4	27	33	32	15	39*	C	11	OX
3	<4 Ha	$\overline{26}$	$\overline{05}$	17	$\overline{05}$	17	$\overline{C}$	$\overline{28}$	C
4	>4 Ha	30	41*	60*	59*	60*	$\overline{C}$	24	C, OX
5	All villgs.	04	26	33*	24	33*	$\overline{C}$	08	C

There is a significant and positive correlation in all villages (rows 1, 2 and 5) when consumer worker ratio is not supplemented by oxen and land. However, in the cases of holdings of over 4 hectares (row 4, column6), gross income is insignificantly correlated with consumer ratio. In these holdings which are mainly in villages 3 and 4, oxen and labour are substituted and supplemented by working capital (hired labour, seed, fertilzer and machine hire) as shall see in later sections.

The main Chayanovian proposition about labour availability and its actual input rests on his fundamental assertion summarized in the following hypothesis.

Hypothesis 1c Gross income in peasant households is more positively correlated with consumer units (CU) than with labour units (LU). p.78

$(\overline{LU}, \uparrow CU \Rightarrow \uparrow GIC) > (\overline{CU}, \uparrow LU \Rightarrow \uparrow GIC)$

Table 4 Gross Incomes/Consumer Units and Gross Incomes/Labour Units (GICLU)

SL NO	Operational Unit	AC		Highest		Lowest		$\overline{C}$, $\overline{OX}$	
		LU	CU	LU	CU	LU	CU	LU	CU
1	2	3	4	5	6	7	8	9	10
1	Villages 1&2	$\overline{08}$	09	45	46	$\overline{03}$	10	$\overline{03}$	10
2	Villages 3&4	05	$\overline{09}$	24	29	$\overline{16}$	$\overline{23}$	$\overline{06}$	02
3	$<$4 Ha	$\overline{18}$	30	54*	59*	$\overline{17}$	15	17	22
4	$>$4 Ha	11	$\overline{11}$	21	54*	$\overline{44}$	$\overline{17}$	09	36
5	All villages	$\overline{13}$	11	06	30	$\overline{28}$	$\overline{03}$	$\overline{07}$	12

While there is a more positive correlation between incomes and consumer units than between income and labour units in villages 1 and 2, this is not so in villages 3 and 4. Overall, however, the correlation is not significant in all cases. Even in villages 1 and 2, when controls are made for size of holding and oxen, the correlation becomes insignificant in all cases. (Columns 9 and 10)

Hypothesis 2a Gross income per labour unit (GICLU) is an increasing function of consumer worker ratio ($\uparrow$CULU $\Rightarrow$ GICLU)

Table 5 Consumer worker ratio and gross income per labour unit.

SL NO	Operational Units	AC	PCC			Highest		Lowest	
		PCC	$\overline{OX}$	$\overline{C}$	$\overline{OX}$, $\overline{C}$	PCC	VARS	PCC	VARS
1	2	3	4	5	6	7	8	9	10
1	Village 1&2	24	60	47	61	89*	LU	$\overline{08}$	C
2	Village 3&4	$\overline{007}$	25	09	$\overline{008}$	38	LU	$\overline{03}$	OX
3	<4 Ha	33	$\overline{05}$	$\overline{12}$	$\overline{04}$	$\overline{03}$	LU, OX	$\overline{34}$	C
4	>4 Ha	34	27	24	02	43	LU	24	$\overline{C}$
5	All villages	$\overline{009}$	20	07	16	29	LU, OX	-007	OX

This hypothesis holds more decisively than hypothesis 1 for villages 1 and 2 (row 1 column 7). The overall correlation for all villages, however, is insignificant and positive. Even for villages 1 and 2, when all other factors are controlled except C, (column 9) the correlation becomes negative, although insignificant.

Hypothesis 2b Gross income per labour day (GICLACR) is an increasing function of consumer/worker ratio ($\uparrow$CULU$\Rightarrow$ $\uparrow$GICLACR)

Table 6 Consumer/worker ratio and gross income per labour day

Sl NO	Operational Unit	AC	Highest		Lowest		PCC		
		PCC	PCC	VARS	PCC	VARS	$\overline{OX}$	$\overline{C}$	$\overline{OX}$, $\overline{C}$
1	2	3	7	8	9	10	4	5	6
1	Villages 1&2	$\overline{42}$	35	OX	$\overline{16}$	CU	18	01	19
2	Villages 3&4	$\overline{13}$	25	CU	$\overline{11}$	OX	22	04	02
3	<4 Ha	$\overline{76}$*	18	C	74*	C	$\overline{05}$	18	$\overline{05}$
4	>4 Ha	48	41	C	05	C	18	05	$\overline{06}$
5	All Villages	$\overline{05}$	16	OX	01	C	16	01	10

While only the correlation with holdings of over 4 hectares and villages 1 & 2 conform to the hypothesis, they become insignificant when controlled for oxen and/or cultivated land (columns 4, 5 and 6).

Hypothesis 3a Gross income per labour unit (GICLU) is an increasing function of consumer/worker ratio (CULU) when labour unit per cultivated land is held constant ($\overline{LUC}$, $\uparrow$CULU $\Rightarrow \uparrow$GICLU).

Table 7 Gross income per labour unit and labour unit per cultivated land and Consumer Worker ratio

NO	Operational Unit	$\overline{LUC}$	LUC	AC	$\overline{LUC, OXENC}$	$\overline{LUC, C}$	$\overline{LUC, C, OXENC}$
1	2	3	4	5	6	7	8
1	Villages 1&2	29	31	15	37	11	65
2	Villages 2&4	32	12	11	23	08	07
3	<4 Ha	04	02	31	02	03	02
4	>4 Ha	30	15	18	29	27	27
5	All villages	22	19	15	20	07	09

As in hypothesis 2b, while the hypothesis holds true for villages 1 and 2, (although insignificantly), it is not so for the new technology adopting villages when cultivated land and oxen per cultivated land are held constant. The positive, though insignificant correlations with holdings of over 4 hectares is unchanged under columns 5 and 6. However, as we shall see in later sections, they are more significantly and positively correlated with other factors of production - TOFAEXP and K than consumer/worker ratio in the table above.

Hypothesis 3b Gross income per labour day (GICLACR) is an increasing function of consumer/worker ratio (CULU) when labour unit per cultivated land is held constant ($\overline{LUC}$, ↑CULU ⇒ ↑GICLACR)

Table 8 Gross income per labour day and consumer/worker ratio

NO	Operational Units	$\overline{LUC}$	LUC	AC	$\overline{LUC}$, $\overline{OXENC}$	$\overline{LUC}$, $\overline{C}$	$\overline{LUC}$, $\overline{C}$, $\overline{OXENC}$
1	2	3	4	5	6	7	8
1	Villages 1&2	$\overline{21}$	25	09	25	16	34
2	Villages 3&4	21	26	15	15	$\overline{15}$	$\overline{13}$
3	<4 Ha	12	46	$\overline{68}$	01	06	$\overline{02}$
4	>4 Ha	16	55	21	15	04	04
5	All villages	15	25	09	14	$\overline{01}$	01

There is no significant correlation between gross incomes per labour day and consumer/worker ratio in all villages and holding sizes.

Hypothesis 4 Gross income per consumer unit (GICCU) is a decreasing function of labour land ratio (LUC) when consumer/worker ratio (CULU) is held constant ($\overline{CULU}$, ↑LUC ⇒ ↓GICCU)

Table 9 Gross income per consumer unit and labour land ratio

Sl. NO	Operational Unit	$\overline{CULU}$	CULU	AC	$\overline{CULU}$, $\overline{OXENC}$	$\overline{CULU}$, $\overline{C}$	$\overline{CULU}$, $\overline{C}$, $\overline{OXENC}$
1	2	3	4	5	6	7	8
1	Villages 1&2	$\overline{68}$*	$\overline{79}$*	$\overline{60}$	92*	$\overline{55}$	$\overline{89}$*
2	Villages 3&4	$\overline{52}$*	$\overline{21}$	04	$\overline{47}$	$\overline{02}$	$\overline{04}$
3	< 4 Ha	$\overline{41}$	$\overline{02}$	$\overline{27}$	$\overline{11}$	$\overline{30}$	$\overline{15}$
4	> 4 Ha	$\overline{59}$*	$\overline{07}$	$\overline{01}$	$\overline{45}$	$\overline{25}$	$\overline{25}$
5	All villages	$\overline{49}$*	07	$\overline{09}$	$\overline{36}$*	$\overline{04}$	$\overline{01}$

This hypothesis is conclusively confirmed by the data only for villages 1 and 2. In the villages with the new technology and holdings of over 4 hectares, there is no correlation either way when all factors - C, OXENC, CUC - are also controlled for together with CULU (Table 9, column 4). This is so, though to a lesser extent in holdings of less than 4 hectares as well. Although there is an adverse land labour ratio tending to decrease per capita income as suggested by the hypothesis in villages 3 and 4 and most of the holdings of over 4 hectares, this is offset by the rising productivity of land with the new technology, as we shall see in the next section. Perhaps more interestingly, the negative correlation between per capita incomes (GICCU) and labour unit per cultivated land (LUC) prevails even when CULU is considered with LUC for villages 1 and 2 (Table 9, column 4). (Cf. hypothesis 5 below.)

Hypothesis 5 Gross income per consumer unit (GICCU) is an increasing function of CULU when land labour ratio is held constant - converse of hypothesis 4 ($\overline{LUC}$, ↑CULU= ↑GICCU)

Table 10 Gross income per consumer unit and consumer/worker ratio

Sl No	Operational Unit	$\overline{LUC}$	LUC	AC	$\overline{LUC}$, OXENC	$\overline{LUC}$, C	$\overline{LUC}$, C, OXENC
1	2	3	4	5	6	7	8
1	Villages 1&2	$\overline{40}$	$\overline{69}$*	$\overline{38}$	$\overline{72}$*	$\overline{38}$	$\overline{45}$
2	Villages 3&4	09	$\overline{24}$	$\overline{12}$	01	$\overline{32}$	$\overline{32}$
3	<4 Ha	04*	01	$\overline{31}$	$\overline{02}$	$\overline{23}$	02
4	>4 Ha	30	33	18	29	27	27
5	All Villages	03	$\overline{15}$	$\overline{16}$	02	$\overline{18}$	$\overline{15}$

In Hypothesis 1, gross income is positively correlated with consumer worker ratio (CULU) when considered with land and capital. In this one (Hypothesis 5) except for holdings of over 4 hectares, the correlation between per capita income and consumer/worker ratio is either significantly negative (villages 1 and 2) or negative but insignificant in all cases (holdings less than 4 hectares) or significant/negative in some cases and insignificant/negative in others (villages 3 and 4). The overall correlation is negative although insignificant. In villages 1 & 2 and holdings of over 4 hectares, however, while there is some positive correlation, such holdings have more strongly correlating factors of production as will be shown later in Section 5.

Hypothesis 6 Gross income (GIC) is a decreasing function of consumer unit per cultivated land (CUC) when consumer/worker ratio is held constant ($\overline{CULU}$, $\uparrow CUC = \downarrow GIC$)

Table 11 Consumer unit per cultivated land and gross incomes

	Operational Unit	$\overline{CULU}$	AC	$\overline{CULU}.\overline{OXENC}$	$\overline{CULU},\overline{C}$	$\overline{CULU},\overline{C},\overline{OXENC}$	CUC, C
1	2	3	4	5	6	7	8
1	Villages 1&2	$\overline{39}$	13	$\overline{34}$	43	11	49
2	Villages 3&4	46*	$\overline{48}$	48*	19	$\overline{01}$	26
3	< 4 Ha	23	29	$\overline{01}$	45	22	20
4	>4 Ha	$\overline{52}$*	$\overline{03}$	$\overline{43}$	17	07	$\overline{61}$
5	All villages	43*		$\overline{37}$*	25	16	22

On the basis of column 3, there is indeed a negative relationship as hypothesised. However, when the effect of holding size is controlled together with the consumer worker ratio (column 6) or holding size and oxen per culti-

vated land (column 7), there is in fact a positive correlation in all villages and holding size groups. This is probably because smaller holdings also tend to have higher consumers per cultivated land, resulting in the correlation results under column 3. The fall in incomes is thus not only because of a rise in the consumer land ratio (CUC), but perhaps more importantly the effect of very low negative correlation between CUC and cultivated land (C).

Hypothesis 7 Gross income per labour day (GICLACR) is a decreasing function of consumers per cultivated land when consumer worker ratio (CULU) is held constant ($\overline{CULU}$, $\uparrow CUC = \downarrow GICLACR$)

Table 12 Gross income per labour day and consumer unit per cultivated land

	Operational Unit	$\overline{CULU}$	CULU	AC	$\overline{CULU, OXENC}$	$\frac{[OXENC, CUC, LUC]}{\overline{CULU, C}}$	$\frac{[CUC, LUC]}{\overline{CULU, C, OXE}}$
1	2	3	4	5	6	7	8
1	Villages 1&2	$\overline{59}$	71*	20	$\overline{88}$	37	88*
2	Villages 3&4	$\overline{26}$	09	18	$\overline{23}$	25	22
3	< 4 Ha	46	32	72*	32	58*	50
4	> 4 Ha	$\overline{48}$	$\overline{01}$	21	$\overline{35}$	01	01
5	All villages	$\overline{25}$	06	11	18	25	24

Except for holdings of less than 4 hectares, the hypothesis appears to hold (column 3) although not significantly in any case. However, when consumer/worker ratio is introduced into the model (column 4), only villages 1 and 2 have a positive and significant correlation between returns to labour per day and the rise in consumer/worker ratio. The negative correlation between declining man land ratio and return to labour does not seem to be a direct result of the consumer/worker ratio, but more of the other factors

of production in the peasant households. In columns 7 and 8 despite the control for CULU, when this is combined with oxen per cultivated land and size of holding (i.e. when CUC and LUC are considered in the model) there is in fact a positive correlation between CUC and GICLACR in all cases.

Hypothesis 8 The productivity of capital (PKGIC, PKGIC1 and PKGIC2) declines with an increase in capital when labour unit (LU) is held constant [$\overline{LU}$, K(OX,TOFAEXP,K) $\Rightarrow$ $\downarrow$PKGIC, $\downarrow$PKGIC1, $\downarrow$PKGIC2] respectively

Table 13 Productivity of capital and capital

SL NO	Operational Unit	$\overline{LU}$	LU	AC	$\overline{LU}$,C	$\overline{LU}$,C,CULU	$\overline{LU}$,C,CU	
1	2	3	4	5	6	7	8	
1	Villages 1&2	$\overline{29}$	$\overline{52}$	$\overline{32}$	10	05	$\overline{09}$	
2	Villages 3&4	$\overline{07}$	$\overline{13}$	$\overline{8}$	$\overline{10}$	$\overline{14}$	$\overline{14}$	
3	<4 Ha	$\overline{11}$	$\overline{16}$	$\overline{15}$	$\overline{15}$	$\overline{19}$	$\overline{18}$	PKGIC
4	>4 Ha	$\overline{29}$	$\overline{32}$	$\overline{44}$	$\overline{40}$	$\overline{29}$	$\overline{20}$	
5	All villages	$\overline{11}$	$\overline{19}$	$\overline{19}$	$\overline{16}$	$\overline{18}$	$\overline{17}$	

SL NO		$\overline{LACR}$	LACR	AC	$\overline{LACR}$,C	
1a	Villages 1&2	$\overline{62}$	70*	$\overline{71}$*	$\overline{60}$	
2a	Villages 3&4	$\overline{41}$*	22	$\overline{24}$	$\overline{19}$	
3a	4 Ha	$\overline{49}$*	56	$\overline{55}$*	$\overline{53}$	PKGIC1
4a	4 Ha	$\overline{61}$*	51	$\overline{54}$	$\overline{55}$	
5a	All villages	$\overline{30}$	10	$\overline{11}$	$\overline{12}$	
1b	Villages 1&2	$\overline{16}$	65	$\overline{64}$	$\overline{11}$	
2b	Villages 3&4	$\overline{34}$	$\overline{39}$	$\overline{36}$	$\overline{41}$	
3b	<4 Ha	34	$\overline{58}$*	$\overline{70}$*	$\overline{49}$*	PKGIC2
4b	>4 Ha	19	$\overline{61}$*	$\overline{70}$*	$\overline{69}$*	
5b	All villages	24	$\overline{41}$*	$\overline{38}$*	$\overline{40}$*	

In all the villages and with all the proxies of the productivity of capital (PKGIC, PKGIC1 and PKGIC2), the relationship is negative, although significant in only a few cases. Contrary to Chayanov's hypothesis, however, the fall in the productivity of capital is more when labour units are entered into the model than when controlled for (cf. columns 3 and 4). Interestingly, the only exceptions are villages 3 and 4 and holdings of over 4 hectares (PKGIC1 - lines 2a and 4a, columns 3 and 4) where the decline in the productivity of capital is less with labour units than without. In the same cases, the correlation is less negative when cultivated land is considered (column 6). This is probably because of the fact that labour is augmented by seed, fertiliser and hired labour in a new production process. While the data as might be expected, reveal a declining return, this does not appear to be because of the shortage of labour as Chayanov hypothesised. Increased labour raises the productivity of capital only with the new technology's inputs.

Hypothesis 9 The productivity of capital (PKGIC, PKGIC1 and PKGIC2) increases with increase in labour (LU) when capital is held constant ($\overline{K}$, $\uparrow$LU $\Rightarrow$ $\uparrow$PKGIC, $\uparrow$PKGIC1 and $\uparrow$PKGIC2)

Table 14 The productivity of capital and labour

	Operational Units	LU, $\overline{OX}$	$\overline{LU}$, OX	AC	$\overline{OX}$, LU, C, CULU	$\overline{OX}$, LU, C, CU	
1	2	3	4	5	6	7	
1	Villages 1&2	04	$\overline{44}$	$\overline{14}$	$\overline{59}$	21	
2	Villages 2&3	$\overline{05}$	$\overline{09}$		$\overline{20}$	12	
3	< 4 Ha	06	07	03	$\overline{05}$	10	PKGIC
4	>4 Ha	13	22	38	$\overline{20}$	15	
5	All Villages	01	$\overline{04}$	$\overline{05}$	$\overline{16}$	01	

		LACR TOFAEXP	TOFA-EXP	AC	TOFAEXP, C	
1a	Villages 1&2	$\overline{41}$	$\overline{15}$	$\overline{22}$	$\overline{32}$	
1b	Villages 3&4	$\overline{22}$	$\overline{21}$	$\overline{22}$	$\overline{20}$	
3a	< 4 Ha	$\overline{15}$	$\overline{17}$	$\overline{09}$	$\overline{15}$	PKGIC1
4a	>4 Ha	$\overline{33}$	$\overline{31}$	$\overline{37}$	$\overline{40}$*	
5a	All Villages	$\overline{19}$	$\overline{17}$	$\overline{17}$	$\overline{17}$	

		$\overline{K}$	K	AC	$\overline{K}$, C	
1b	Villages 1&2	$\overline{03}$	$\overline{40}$	$\overline{64}$	$\overline{07}$	
2b	Villages 3&4	$\overline{11}$	$\overline{22}$	$\overline{36}$	$\overline{14}$	
3b	<4 Ha	$\overline{27}$	42	70	$\overline{32}$	PKGIC2
4b	>4 Ha	10	18	46	29	
5b	All Villages	$\overline{07}$	$\overline{21}$	$\overline{13}$	$\overline{10}$	

Labour input raises the productivity of capital (OX) in villages 1 and 2 and holdings of less than 4 hectares, while it is negatively correlated in holdings of over 4 hectares; it is insignificant in all cases (rows 1 and 3, columns 3 and 4). In the model for TOFAEXP, the correlation is negative and insignificant, & there is no marked difference whether labour in crops is controlled for or not. Again, as in the model for OX, the productivity of capital is positively correlated with labour and more so when augmented by capital in holdings of over 4 hectares. In general, there is no significant

and consistent positive correlation between labour input and the productivity of capital when the proxies for capital are controlled for. Where there is such a relationship, it is with larger holdings and the new technology inputs.

Hypothesis 10 The correlation between labour unit and gross incomes is higher (when capital labour ratio is controlled) than the correlation between capital labour ratio and gross incomes (when labour unit is controlled).

P.99

$(\overline{K/LU}, \uparrow LU \Rightarrow \uparrow GIC) > (\overline{LU}, K/LU \Rightarrow \uparrow GIC)$

Table 15 Gross incomes and labour unit/capital labour ratio and ratio

SL	Operational Unit	AC		Highest		Lowest	
		LU	K/LU	LU	K/LU	LU	K/LU
1	2	3	4	5	6	7	8
1	Villages 1&2	73*	71	69	63	39	35
1	Villages 3&4	58*	97*	01	95*	22	92*
3	<4 Ha	48	12	51	08	47	08
4	>4 Ha	53	92*	20	90*	27	90*
5	All villages	48*	91*	09	89*	09	84*

Hypothesis 10 is a synthesis of the Chayanovian formulation of the "labour farm" in which resource allocation for the mainly consumption demand of the peasant farm (GIC) is regulated more by the supply of family labour rather than capital. In villages 1 and 2 there is no discernible difference in the correlation between labour unit and capital labour ratio with gross incomes (Table 15, Row 1). In villages 3 and 4 and for all villages on the other hand, income is more positively and significantly correlated with capital labour ratio than is the case with labour.

3.55 The Basis of the Differentiation of the Chilalo Peasantry: Chaynovian Demographic Differentiation Versus the Leninist Socio-Economic Differentiation:

In order to simultaneously compare the coefficients between the proxies used for income (GIC, GICCU), return to labour (GICLU, GICLAR), land productivity (GICRC, NFICRC) and the productivity of capital (PKGIC, PKGIC1, PKGIC2) on the one hand and the demographic (CU, CULU), and resource variables of the peasant households (C, LU, OX) on the other, the Chayanovian formulation has been recast and modelled. The following section sets out the result of such a model constructed to capture both the original hypothesis tested above in section 4, the inclusion of the new technology inputs (TOFAEXP) and a direct comparison between the demographic factors and the means of production (cultivated land, ox, working capital) used/controlled by the peasant households in explaining variations in income, return to labour, land productivity and the productivity of capital.

In villages 1 and 2, the highest correlation is between gross incomes and OX. The correlation of the other resources (cultivated land (C), consumer/worker ratio (CULU), and labour unit (LU)) also attain the highest level with OX (Table 16a, lines 1 & 3, columns 4, ~~N~~ ~~N~~). While the highest correlation between gross incomes and OX is when it is with cultivated land (C,) the latter also attains its highest correlation together with OX. However, in view of the rather elastic supply of cultivable land in Chilalo, it is argued that fixed capital in the form of oxen is the independent variable.

Although at a much lower level than OX and cultivated land, the labour components of family resources (CU, LU, CULU) also have a significant and positive correlation with gross income when they are combined with land and oxen.

Their correlation changes to significantly negative level without land and oxen (Table 16a, lines 1 & 3, columns 16, 21 26). On the other hand, despite the control of the demographic components, land and OX have a significant and positive correlation with income.

In the two villages which adopted the new technology, while land has an even higher correlation with income, that of OX is much less so (Table 16a-b, lines 2 & 4, columns 9 & 11). This is because in a number of households, OX

25. In all cases, the significant and non-significant correlations can be compared with the Table appended to this chapter.

Table 16a : Gross Income from Crops (GIC) and Total Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	37	*76	OX	45	CULU	64	*84	C	66	CU CULU	08	05	OX	$\overline{41}$	C	09	46	OX	44	$\overline{C}$	02	42	OX	$\overline{38}$	LU CULU
2	Vill. 3 & 4	*88	*90	$\overline{CU}$	*88	ALL	27	29	C	$\overline{02}$	$\overline{CULU}$	05	24	$\overline{C}$	$\overline{16}$	$\overline{LU}$	$\overline{09}$	29	$\overline{C}$	23	$\overline{LU}$ $\overline{CULU}$	27	39	C	11	OX
3	< 4 Ha	19	36	$\overline{CULU}$	19	LU	$\overline{07}$	49	$\overline{C}$	$\overline{14}$	C	$\overline{18}$	*54	$\overline{CULU}$	$\overline{17}$	OX	30	*59	$\overline{CULU}$	15	CULU	$\overline{26}$	17	$\overline{C}$	$\overline{28}$	C
4	> 4 Ha	*92	*92	LU $\overline{CU}$	*89	$\overline{LU}$	24	33	CULU	$\overline{05}$	C.OX	11	21	OX	$\overline{44}$	CULU	$\overline{11}$	*54	$\overline{CULU}$	$\overline{18}$	OX	30	*60	$\overline{C}$	24	C.OX
5	All Farms	*87	*87	ALL	*87	LU $\overline{CULU}$	08	19	$\overline{C}$	$\overline{02}$	$\overline{CU}$	$\overline{13}$	06	$\overline{C}$	$\overline{28}$	$\overline{C}.\overline{LU}$	11	30	CULU	$\overline{03}$	LU	04	*33	$\overline{C}$	08	C

Table : 16b Gross Income from Crops (GIC) and Resource Inputs

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	68	*79	K	62	$\overline{K}$	06	36	K	$\overline{25}$	$\overline{K}$	75	83	C	73	$\overline{C}$	$\overline{47}$	17	$\overline{K}$	$\overline{49}$	$\overline{K},\overline{C}$
2	Vill. 3 & 4	*78	*89	$\overline{LACR}$	*69	$\overline{TOFA}$	39	*87	$\overline{LACR}$	36	LACR	31	68	$\overline{TOFA}$	$\overline{09}$	$\overline{TOFA}$	*53	$\overline{09}$	$\overline{C},\overline{K}$	$\overline{47}$	$\overline{K}$
3	< 4 Ha	*55	51	K	35	$\overline{K}$	*58	*72	K	43	C	$\overline{26}$	57	TOFA	$\overline{22}$	LACR	$\overline{30}$	$\overline{02}$	$\overline{K}$	$\overline{06}$	K
4	> 4 Ha	*73	*88	$\overline{LACR}$	*70	$\overline{TOFA}$	30	*89	$\overline{LACR}$	27	K	38	*81	LACR	$\overline{05}$	$\overline{TOFA}$	$\overline{47}$	$\overline{04}$	$\overline{C}$	$\overline{46}$	
5	All Farms	*73	*86	$\overline{LACR}$	*66	$\overline{TOFA}$	*59	*88	$\overline{LACR}$	*55	LACR	15	*67	LACR	$\overline{07}$	$\overline{TOFA}$	*46	$\overline{06}$	$\overline{K}$	*44	$\overline{K}$

\- Negative with coef.
controlled with va
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Coef.

is substituted by machine and hired labour. The relation of income with family resources for these villages is best examined in Table 16b, where total working capital - TOFAEXP (purchase of seed, fertilizer, machine hire, labour hire) is incorporated into the correlation model. While there is a high and positive correlation between income on the one hand and cultivated land (C), working capital (TOFAEXP) and total capital (K) on the other, the relation with labour in crops (LACR) is negative and significant.

The general pattern of the correlations with cultivated land is similar to the total factors. Increase in oxen services is, however, negatively correlated with incomes when cultivated land is not controlled, perhaps indicating some underemployment of oxen/or the substitution of oxen by other factors as holding size increases.

2. Per capita gross income (GICCU) and family resources (Tables 17a-b)

Oxen and cultivated land (C) in villages 1 and 2, and cultivated land (C) and working capital (TOFAEXP) in villages 3 and 4 are most positively and significantly correlated with per capita income (Tables 17a, columns 4 and 9; Tables 17b., column 9). Consumer/worker ratio and labour unit are positively correlated with per capita income in villages 1 and 2 when augmented by oxen. While there is an insignificant positive correlation between per capita income and consumer units, this changes to negative with increases in labour unit and controlling cultivated land. The insignificant and positive correlation with consumer unit holds only when cultivated land increases.

Table 17a: Income from Crops per Consumer Unit (GICCU) and Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	53	83	OX	21	$\overline{OX}$	*72	*89	C	46	$\overline{C}$	$\overline{02}$	55	OX	*$\overline{89}$	CULU	11	31	C	*$\overline{81}$	LU	$\overline{16}$	51	OX	$\overline{38}$	$\overline{C}.\overline{LU}$
2	Vill. 3 & 4	*81	*81	CU	*78	$\overline{OX}$	12	17	CU	$\overline{27}$	$\overline{C}$	$\overline{26}$	01	C	*$\overline{46}$	$\overline{C}$	14	18	OX	*$\overline{45}$	$\overline{C}$	$\overline{21}$	25	$\overline{OX}$ $\overline{CU}$	$\overline{36}$	$\overline{C}$
3	< 4 Ha	$\overline{01}$	08	OX	*03	LU	$\overline{26}$	01	CU	$\overline{30}$	$\overline{C}$	$\overline{41}$	05	$\overline{C}$	$\overline{41}$	C	40	41	C	31	$\overline{C}$	$\overline{51}$	$\overline{30}$	LU. OX	$\overline{51}$	C
4	> 4 Ha	*83	*85	$\overline{CU}$	*83	$\overline{CULU}$	$\overline{41}$	$\overline{08}$	CULU	$\overline{28}$	$\overline{CULU}$	05	08	C	$\overline{39}$	$\overline{C}$	$\overline{12}$	09	$\overline{LU}$	$\overline{40}$	C.CULU	11	19	C. LU	08	$\overline{C}$
5	All Farms	*81	*81	OX	*77	$\overline{CULU}$	$\overline{03}$	02	C.OX	$\overline{30}$	$\overline{C}$	$\overline{27}$	$\overline{13}$	C.OX	$\overline{44}$	$\overline{C}$	16	16	OX	*$\overline{41}$	$\overline{C}$	$\overline{20}$	$\overline{10}$	$\overline{CU}$	$\overline{20}$	OX

Table17b: Income from Crops per Consumer Unit (GICCU) and Resource Inputs

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	34	59	K	27	K	08	29	K	$\overline{09}$	C	49	66	C	45	LACR	$\overline{26}$	15	$\overline{TOFA}$	$\overline{26}$	TOFA
2	Vill. 3 & 4	*68	*86	$\overline{LACR}$	*55	LACR	25	69	LACR	01	$\overline{C}$	$\overline{21}$	37	$\overline{LACR}$	*$\overline{41}$	$\overline{TOFA}$	*$\overline{62}$	$\overline{25}$	$\overline{K}$	*$\overline{64}$	K
3	< 4 Ha	28	15	LACR	03	$\overline{TOFA}$	*66	*63	C	06	$\overline{C}$	*$\overline{68}$	$\overline{21}$	$\overline{LACR}$	*$\overline{64}$	LACR	$\overline{35}$	$\overline{16}$	$\overline{K}$	$\overline{19}$	K
4	> 4 Ha	*76	*88	$\overline{LACR}$	*68	LACR	18	*75	$\overline{LACR}$	$\overline{03}$	$\overline{C}$	$\overline{06}$	*59	$\overline{LACR}$	21	LACR	*$\overline{58}$	$\overline{54}$	$\overline{K}$	*$\overline{60}$	K
5	All Farms	*87	*84	$\overline{LACR}$	*54	$\overline{TOFA}$	*42	*71	$\overline{LACR}$	18	$\overline{C}$	$\overline{29}$	*40	$\overline{LACR}$	*37	$\overline{TOFA}$	*$\overline{57}$	21	$\overline{K}$	*$\overline{60}$	K

-	Negative with coef controlled with va
C	Size of cult. land (Ha)
OX	Value of oxen
LU	Labour units
CU	Consumer units
CULU	Consumer/labour
TOFAEXP	Working capital
K	Total capital
LACR	Labour input
AC	All controlled
var	Variables
cc	Partial Coor. Coef

Except in villages 1 and 2 where consumer unit and cultivated land are more positively correlated with per capita incomes, the general pattern of the correlation coefficients is similar for the other resources (Cf. Tables 17a and Table 17b).

3. Gross income per hectare (GICRC) and family resources (Tables 18a-b)

.This is perhaps the most interesting aspect of the model and of immediate relevance to agrarian reform especially in areas like Chilalo, which are not so beset by the land constraint as in the Indian subcontinent where the holding size productivity debate (Dandekar 1962, Sen 1980, Patnaik 1976, Rudra 1979, Ghose 1979) draws most of its empirical evidence. While there is some evidence of inverse relationship between size of holding and productivity per hectare in villages 1 and 2, in villages 3 and 4 the relationship is both positive and significant in all the models (Table 18a, column 4; Tables 18b, column 4). It is also interesting to note that the highest of such correlations in villages 1 and 2 is with consumer units and OX, while in villages 3 and 4 it is with fixed and working capital where labour unit is controlled (Table 18). As might be expected, there is a positive correlation between productivity of land and the other factors of production. However, the positive correlation with the labour components is less so and more insignificant than in others.

Table 18a: Gross Income from Crops per Hectare (GICRC) and Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	$\overline{66}$	$\overline{13}$	CULU LU	*$\overline{69}$	CULU OX	54	57	CULU	$\overline{12}$	$\overline{CU}$	$\overline{25}$	34	CU CULU	$\overline{49}$	$\overline{CULU}$	25	46	CULU	$\overline{36}$	C.OX	$\overline{12}$	94	CU	20	$\overline{C}$
2	Vill. 3 & 4	27	34	$\overline{OX}$	23	$\overline{CULU}$	24	*47	$\overline{C}$	19	C.CU	14	*44	$\overline{C}$	03	C CULU	$\overline{11}$	*45	$\overline{C}$	$\overline{18}$	C	15	*36	$\overline{C}$	$\overline{01}$	$\overline{C}$.CU
3	< 4 Ha	$\overline{34}$	$\overline{27}$	$\overline{OX}$	$\overline{34}$	LU.OX	$\overline{13}$	41	$\overline{C}$	$\overline{03}$	LU CULU	$\overline{21}$	41	C	$\overline{21}$	C.OX	32	46	$\overline{C}$	11	$\overline{OX}$	$\overline{26}$	16	$\overline{C}$	$\overline{23}$	OX
4	> 4 Ha	*50	*55	$\overline{CU}$	*44	CULU	24	29	CULU	08	$\overline{CU}$	$\overline{02}$	19	C CULU	*45	$\overline{CU}$.$\overline{OX}$	03	54	CULU	06	LU CULU	15	57	$\overline{C}$	20	C
5	All Farms	31	33	$\overline{OX}$	29	$\overline{CU}$ $\overline{CULU}$	07	29	$\overline{C}$	04	$\overline{CU}$	$\overline{17}$	23	OX CULU	$\overline{23}$	$\overline{CULU}$	20	*38	$\overline{LU}$	11	LU	$\overline{06}$	32	$\overline{C}$	$\overline{07}$	OX

Table 18b: Gross Income from Crops per Hectare (GICRC) and Resource Inputs

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	*$\overline{67}$	$\overline{50}$	$\overline{LACR}$	*$\overline{75}$	$\overline{K}$	*71	*76	$\overline{C}$	63	TOFA	57	65	TOFA	$\overline{14}$	$\overline{TOFA}$	$\overline{61}$	$\overline{29}$	$\overline{C}$	$\overline{61}$	TOFA
2	Vill. 3 & 4	$\overline{16}$	27	$\overline{LACR}$	$\overline{28}$	$\overline{TOFA}$	20	*57	TOFA	10	C	35	*66	$\overline{LACR}$	33	LACR	$\overline{15}$	16	TOFA	$\overline{18}$	C
3	< 4 Ha	02	24	$\overline{K}$	$\overline{40}$	C	*67	*70	$\overline{LACR}$	*64	$\overline{K}$	$\overline{43}$	50	TOFA	$\overline{45}$	C	$\overline{37}$	24	$\overline{K}$	$\overline{40}$	C
4	> 4 Ha	$\overline{17}$	*45	$\overline{LACR}$	23	K	30	*70	$\overline{LACR}$	25	C	24	*71	$\overline{LACR}$	21	LACR	$\overline{12}$	19	$\overline{C}$	$\overline{13}$	$\overline{K}$
5	All Farms	23	27	$\overline{TOFA}$ $\overline{LACR}$	28	$\overline{TOFA}$	*39	*64	$\overline{LACR}$	31	$\overline{K}$	22	*62	$\overline{LACR}$	19	LACR	$\overline{13}$	63	$\overline{C}$	$\overline{18}$	C

- Negative with coe controlled with v
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Coe

Since in the overall model, the proxy used for income was gross income from crops, we also considered net farm incomes (gross incomes less TOFAEXP) from crops per hectare to examine whether the higher productivity with increasing holding size in villages 3 and 4 on the one hand and the higher holdings was because of increased cost of the new technology inputs or higher profitability from the new inputs and/or associated farm management practices, economies of scale.[26]

4. Net Income per Hectare (NFICRC) and Family Resources (Tables 19a-b)

In both total resource and the actual input models, the most significant change compared to the previous 3 correlations is that the relationship is positive although insignificant even for the non-new technology villages and holdings of less than 4 hectares.[27] The other income and productivity/resource relationships are similar to gross incomes under 3.

The Chayanovian thesis postulates that the higher the consumer worker ratio, the higher the labour input and also of income per labour unit in the household (Chayanov; 1966, pp.78-79). Two measures of return to labour were constructed under 5 and 6 - gross income per labour unit (GICLU) and gross income per labour/day (GICLACR).

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26. This issue is further taken up in chapter six, section four, with the process of differentiation with absolute measurements of inputs and outputs rather than correlations as in this chapter.

27. This implies that the smaller holdings use purchased farm inputs less efficiently compared to larger holdings and/or there is apparent economies of scale.

Table 19a: Net Farm Incomes from Crops per Hectare (NFICRC) and Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	34	11	$\overline{CU}$	39	LUCU	41	48	LUCU	24	C	08	30	C.OX	15	CULU	09	16	$\overline{CULU}$	29	C.OX	04	27	C.OX	11	C
2	Vill. 3 & 4	07	17	CULU	07	OX	28	28	C	16	$\overline{CULU}$	19	21	C	11	CU	24	13	C	27	C	25	29	C	05	LU.CU
3	< 4 Ha	21	01	$\overline{CULU}$	21	LU	34	21	C	29	LU	23	30	CU.OX	22	C	39	40	CULU LU	01	OX CULU	37	06	C	35	LU.CU
4	> 4 Ha	35	42	CULU LU	30	LU.OX	24	34	CULU	17	$\overline{CULU}$	19	27	C.OX	40	C CULU	23	34	$\overline{LU}$	25	C	34	49	C LU	36	C
5	All Farms	26	27	CULU CU	25	LU.OX	08	17	C	06	$\overline{CU}$	12	09	C	13	OX	12	19	$\overline{LU}$	01	LU	07	15	LU	05	C

Table 19b: Net Farm Income from Crops per Hectare (NFICRC) and farm Resources

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	35	01	LACR	59	LACR	*70	45	LACR	*68	K	65	61	LACR	28	LACR	31	14	K	40	C
2	Vill. 3 & 4	14	20	LACR	02	TOFA	04	24	LACR	11	LACR	17	34	LACR	21	TOFA	24	16	C	23	TOFA
3	< 4 Ha	15	08	K	02	K	38	36	C	31	C	26	19	C	23	C	29	19	C	25	C
4	> 4 Ha	18	36	LACR	10	K	14	39	LACR	13	LACR	30	46	LACR	20	TOFA	19	05	C	23	C
5	All Farms	10	30	LACR	06	LACR	05	*36	LACR	05	LACR	17	27	TOFA	12	LACR	19	19	C	12	TOFA

\- Negative with coef
controlled with va
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Coef

Table 20a : Gross Income from Crops per Labour Unit (GICLU) and Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	55	*83	OX	16	$\overline{OX}$	*77	*91	C	15	$\overline{C}$	$\overline{16}$	50	OX	*92	CU	06	*72	CULU C	*91	LU	34	*80	LU CULU	*08	C
2	Vill. 3 & 4	*84	*86	CULU CU	*83	LU	13	19	CULU	$\overline{15}$	$\overline{C}$	$\overline{19}$	07	C.OX	$\overline{29}$	OX CULU	05	20	$\overline{LU}$	$\overline{34}$		$\overline{01}$	38	$\overline{CU}$	03	OX
3	< 4 Ha	09	15	CU	09	LU CULU	$\overline{21}$	02	CU	$\overline{25}$	C	36	$\overline{05}$	$\overline{OX}$	$\overline{35}$	C	34	36	C	$\overline{15}$	$\overline{C}$	$\overline{33}$	$\overline{03}$	LU OX	$\overline{34}$	C
4	> 4 Ha	*87	*87	$\overline{OX}$	*86	$\overline{CULU}$	$\overline{12}$	$\overline{01}$	CULU	$\overline{19}$	C	20	15	C	$\overline{37}$	$\overline{CULU}$	26	24	C CULU	$\overline{39}$	$\overline{CULU}$	34	43	LU	24	$\overline{C}$
5	All Farms	31	*84	$\overline{LU}$	*81	CULU	07	14	$\overline{CULU}$	$\overline{26}$	LU.CU	$\overline{17}$	$\overline{08}$	C	41	CU.OX	20	20	C CULU	$\overline{29}$	LU	06	29	LU OX	$\overline{01}$	OX

Table 20b: Gross Income from Crops per Labour Unit (GICLU) and Resource Inputs

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	28	41	K	15	K	26	33	$\overline{C}$	15	C	14	37	$\overline{LACR}$	12	LACR	$\overline{13}$	10	TOFA	$\overline{11}$	K
2	Vill. 3 & 4	*78	*92	$\overline{LACR}$	*62	LACR	31	*77	$\overline{LACR}$	13	$\overline{C}$	$\overline{10}$	36	$\overline{TOFA}$	$\overline{32}$	C	*71	$\overline{26}$	$\overline{K}$	*72	K
3	< 4 Ha	41	31	LACR	08	TOFA	*74	*70	LACR	22	$\overline{C}$	*72	$\overline{07}$	$\overline{LACR}$	*68	LACR	$\overline{34}$	$\overline{08}$	$\overline{K}$	$\overline{16}$	K
4	> 4 Ha	*74	*91	$\overline{LACR}$	*70	LACR	26	*82	$\overline{LACR}$	14	$\overline{C}$	03	*68	LACR	$\overline{32}$	$\overline{TOFA}$	*65	*66	$\overline{C}$	*66	K
5	All Farms	73	88	$\overline{LACR}$	58	LACR	52	79	$\overline{LACR}$	33	$\overline{C}$	$\overline{24}$	49	$\overline{LACR}$	$\overline{34}$	$\overline{TOFA}$	$\overline{64}$	$\overline{22}$	$\overline{K}$	$\overline{66}$	K

\- Negative with coe
controlled with va
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Coe

5. Income per Labour Unit (GICLU) and Family Resources

(Tables 20a-b)

There is indeed a high correlation between gross income from crops per labour unit and the demographic factors of production (consumer worker ratio - CULU) and consumption unit (CU) in villages 1 and 2. This is so, however, only when each is supplemented by ox and/or land. Without land and oxen, consumer unit, consumer labour ratio and labour unit are all significantly negative or insignificantly positive in all cases (Tables 20a-b columns 15-18).

In villages 3 and 4, the demographic factors have little or no significant correlation with income per labour unit (tables 20a , columns 16-21). Land (C), total farm expenses (TOFAEXP) and capital(K) are significantly and positively correlated with GICLU. The general correlation pattern is unchanged with resource availability and use in models a and b (tables 20a and 20b).

6. Income per Labour Input (GICLACR) and Family Resources

(Tables 21a-b)

As in 5, the correlation between the productivity of labour and consumer worker ratio is positive and significant with oxen and land in some cases (villages 1 and 2 and holdings of over 4 hectares) and positive but insignificant in others (table 21a columns 14, 19 and 24). In villages 3 and 4, there is no significant correlation between the productivity of labour on the one hand and consumer unit and labour unit on the other. As in section 5, cultivated land and TOFAEXP are positively and significantly correlated with GICLACR (tables 21a-b columns and 9).

The partial correlation coefficients significantly increase

Table 21a: Gross Income from Crops per Labour Input (GICLACR) and Farm Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	19	42	CU	11	CULU	25	55	CULU	38	C	12	37	OX	18	C CULU	13	17	C CULU	37	OX	17	35	OX	16	CU
2	Vill. 3 & 4	*67	*69	CU CULU	*66	LU	67	01	LU	18	CULU	13	04	C.OX	20	CULU	17	19	C CULU	21	CULU	13	25	CU	11	OX
3	< 4 Ha	31	15	CULU	25	LU	*61	51	C	56	C	*70	16	C	*69	C	*81	*79	C	40	OX CULU	*76	18	C	*74	C
4	> 4 Ha	*79	*78	CU	42	CU	42	27	CU	38	C	46	34	C	28	CULU	47	10	LU	38	C	48	41	C	05	C
5	All Farms	*67	*68	LU	*66	CULU	11	66	CULU	15	C	13	01	OX	17	C	11	15	LU	16	LU.OX	05	16	OX	01	C

Table21b: Labour Productivity (GICLACR) and Family Resources

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	*70	*75	K	*79	K	33	32	K	51	C	*75	08	LACR	*83	LACR	*88	*87	TOFA	33	TOFA
2	Vill. 3 & 4	*90	17	LACR	40	LACR	*80	07	LACR	11	C	54	37	LACR	28	TOFA	*53	*87	K	*87	C
3	< 4 Ha	*57	*59	K	10	K	47	*79	K	16	K	03	*72	TOFA	11	LACR	*80	*58	C	*80	K
4	> 4 Ha	*68	*89	LACR	*59	LACR	39	*82	LACR	01	C	14	*65	LACR	41	TOFA	*80	*76	K	*82	C
5	All Farms	*71	*87	LACR	*39	LACR	*45	*80	LACR	22	C	07	55	LACR	26	TOFA	*83	*67	C	*84	K

- Negative with co
controlled with
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Co

Table 22a : Productivity of Capital (PKGIC - OX) and Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	49	*68	CU	20	$\overline{CU}$	$\overline{32}$	49	LU.CU	$\overline{63}$	$\overline{C}$	14	*74	OX CULU	21	CU	16	*73	OX CULU	07	$\overline{C}$	04	*69	LU OX	36	C
2	Vill. 3 & 4	35	*74	CU CULU	*70	OX	$\overline{25}$	07	$\overline{LU}$	$\overline{28}$	$\overline{CULU}$		09	C.OX	$\overline{24}$	$\overline{C}$	08	17	$\overline{LU}$	$\overline{19}$	$\overline{C}$	$\overline{15}$	34	$\overline{CU}$	05	C
3	< 4 Ha	$\overline{03}$	03	LU.OX	$\overline{05}$	LU CULU	$\overline{15}$	$\overline{11}$	$\overline{C}$	$\overline{19}$	CULU	03	10	CU	$\overline{08}$	CU.OX	02	10	C.LU	10	$\overline{CULU}$	07	17	CU	07	C
4	> 4 Ha	*78	*78	CU	*76	LU	$\overline{44}$	$\overline{29}$	C CULU	$\overline{40}$	C	38	29	C	$\overline{28}$	$\overline{CULU}$	$\overline{40}$	$\overline{32}$	C	$\overline{32}$	C	$\overline{40}$	38	C	13	$\overline{C}$
5	All Farms	*68	*73	All	*70	All	$\overline{19}$	$\overline{11}$	$\overline{LU}$	$\overline{28}$	$\overline{C}$	$\overline{05}$	$\overline{01}$	C	$\overline{28}$	CU.OX	02	19	C CULU	*68	LU	06	21	CU	06	$\overline{C}$

Table 22b: Productivity of Capital (PKGIC-OX) and Resource Inputs

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	*78	*72	LACR	32	$\overline{TOFA}$	*70	66	LACR	23	$\overline{LACR}$	*72	29	$\overline{TOFA}$	$\overline{48}$	$\overline{C}$	$\overline{44}$	43	K	$\overline{38}$	$\overline{C}$
2	Vill. 3 & 4	*71	*89	$\overline{LACR}$	43	LACR	46	*79	$\overline{LACR}$	13	$\overline{C}$	$\overline{26}$	46	$\overline{LACR}$	$\overline{41}$	C	*80	$\overline{47}$	$\overline{K}$	*81	K
3	< 4 Ha	02	02	$\overline{K}$	01	TOFA	$\overline{01}$	$\overline{01}$	C	$\overline{01}$	K	$\overline{05}$	$\overline{04}$	$\overline{C}$	$\overline{11}$	C	$\overline{03}$	$\overline{02}$	$\overline{K}$	$\overline{04}$	$\overline{C}$
4	> 4 Ha	*64	*88	LACR	*55	LACR	*55	*85	$\overline{LACR}$	10	$\overline{C}$	$\overline{27}$	*65	$\overline{LACR}$	$\overline{46}$	$\overline{TOFA}$	*81	*68	$\overline{K}$	*82	K
5	All Farms	*68	*85	$\overline{LACR}$	*43	LACR	*56	*79	$\overline{LACR}$	25	$\overline{C}$	$\overline{32}$	*47	$\overline{LACR}$	*39	$\overline{TOFA}$	*76	*38	$\overline{K}$	*77	$\overline{C}$

-	Negative with coef controlled with va
C	Size of cult. land (Ha)
OX	Value of oxen
LU	Labour units
CU	Consumer units
CULU	Consumer/labour
TOFAEXP	Working capital
K	Total capital
LACR	Labour input
AC	All controlled
var	Variables
cc	Partial Coor. Coef

with per ... consumer unit (table 21a, column 9) while be ing largely unchanged in others.

7. The Productivity of Capital (PKGIC-OX) and Family Resources (Tables 22a-b)

The productivity of oxen ($\frac{GIC}{VOX}$ x 100 where GIC = gross income from crops, VOX=Value of ox) is more positively and significantly correlated with cultivated land (table 22a, columns 4, and 7) and TOFAEXP (table 22b, columns 4 and 9) rather than labour unit or labour use in crop formulated in the Chayanovian hypothesis. In fact, the productivity of oxen and labour in crops (LACR) are negatively and significantly correlated except in villages 1 and 2 (table 22b, column 11).

Although negative but insignificant in most instances, the highest correlation between the productivity of oxen and (proxy for capital) family resources is not in conjunction with labour as Chayanov hypothesized (Chayanov 1966: pp.98-99) but when control is made for labour unit (table 22a).

The correlation between the productivity of oxen and the other demographic factors such as consumer worker ratio and consumption unit, are positive but insignificant except in villages 1 and 2.

8. The Productivity of Capital (PKGICI-TOFAEXP) and Family Resources (tables 23a-b)

Unlike under 7 above, where the proxy for capital is oxen, there is a positive (although ..significant only in one case) correlation between labour unit and the productivity of purchased farm inputs (TOFAEXP) (Table 23a, column 9). While this may appear to be in conformity with the

Table 23a : Productivity of Capital (PKGICL - Working Capital) and Family Resources

Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	45	07	CULU	62	OX	02	55	CULU	01	LU CULU	40	56	C CULU	52	OX	38	50	OX	57	C CULU	55	36	CU	65	OX
2	Vill. 3 & 4	34	26	CULU	33	LU	03	03	C	26	C	08	09	OX	28	LU	15	01	CULU	30	LU.OX	16	17	C	12	CULU
3	< 4 Ha	12	03	CU	12	LU	22	13	C.CU	22	CU CULU	12	09	CULU	13	C	17	15	C	18	C	21	13	C	22	C
4	> 4 Ha	39	39	LU.CU	44	CU	13	23	CU	04	C	07	25	CU	28	C CULU	12	07	C	41	LU.CU LU	02	06	C.OX	36	C.OX
5	All Farms	25	25	LU.OX	28	OX	07	03	CU	19	C	06	09	CU	13	CU.OX	04	03	C.OX	22	C	12	11	C	23	C.OX

Table 23b: Productivity of Capital (OKGICI - Working Capital) and Resource Inputs

Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	47	06	TOFA	58	TOFA	*71	56	K	*72	C	12	08	LACR	32	TOFA	22	15	TOFA	41	TOFA
2	Vill. 3 & 4	15	18	K	19	LACR	24	19	C	*43	C	06	11	C	*39	C	22	20	C	29	C
3	< 4 Ha	15	20	LACR	09	TOFA	*55	49	LACR	*56	LACR	39	40	LACR	30	C	09	13	K	18	C
4	> 4 Ha	35	26	LACR	41	LACR	54	50	K	*61	LACR	32	28	C	42	LACR	37	26	K	43	C
5	All Farms	02	03	K	19	LACR	11	10	LACR	10	LACR	10	10	C	30	LACR	17	18	C. TOFA	23	C

\- Negative with coef. controlled with var
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Coef.

Table 24a: Productivity of Capital (PKGIC 2 - Total Capital) and Family Resources — Model a

SL NO	Units	C					OX					LU					CU					CULU				
		Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.					Par. Corr. Coef.				
		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest		A	Highest		Lowest	
		C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var	C	cc	var	cc	var
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Vill. 1 & 2	66	*80	LU.CU	44	$\overline{CU}$	$\overline{40}$	26	LU	*$\overline{68}$	LU CULU	$\overline{10}$	26	$\overline{CULU}$	*$\overline{71}$	OX CULU	12	*71	OX. CULU	12	C	06	65	OX LU	$\overline{47}$	C
2	Vill. 3 & 4	02	04	$\overline{CULU}$	$\overline{04}$	$\overline{OX}$	$\overline{38}$	$\overline{34}$	$\overline{CU}$	*$\overline{46}$	$\overline{C}$	13	16	$\overline{OX}$	$\overline{32}$	$\overline{C}$	13	16	C.LU	$\overline{32}$	$\overline{C}$	$\overline{16}$	30	$\overline{C}$	$\overline{19}$	$\overline{LU}$
3	< 4 Ha	24	40	LU.CU	21	LU	*$\overline{61}$	$\overline{34}$	$\overline{CULU}$	*$\overline{66}$	C	51	53	C.CU	$\overline{31}$	C	51	53	C	$\overline{31}$	$\overline{C}$	$\overline{46}$	01	C 56	$\overline{47}$	C
4	> 4 Ha	*52	*52	LU.CU	45	$\overline{LU}$	*54	*$\overline{54}$	C	*$\overline{64}$	$\overline{C}$	15	29	CULU	$\overline{41}$	$\overline{CULU}$	15	29	C	$\overline{41}$	$\overline{C}$	22	05	$\overline{CU}$	$\overline{35}$	OX
5	All Farms	12	13	CU	09	$\overline{LU}$	*$\overline{42}$	$\overline{37}$	C.CU	*$\overline{43}$	$\overline{C}$	26	25	C.LU	$\overline{24}$	$\overline{C}$	26	25	C	$\overline{24}$	$\overline{C}$	$\overline{28}$	$\overline{09}$	C CU	$\overline{27}$	C

Table 24b: Productivity of Capital (PKGIC 2 - Total Capital) and Resource Inputs — Model b

SL NO	Units	C					TOFAEXP					K					LACR				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Vill. 1 & 2	*78	*78	TOFA	*45	$\overline{TOFA}$	20	19	LACR	$\overline{26}$	$\overline{LACR}$	$\overline{64}$	$\overline{11}$	C	$\overline{65}$	LACR	$\overline{39}$	$\overline{03}$	$\overline{K}$	$\overline{41}$	$\overline{C}$
2	Vill. 3 & 4	09	25	TOFA	05	$\overline{LACR}$	12	26	C	$\overline{27}$	$\overline{C}$	$\overline{36}$	$\overline{34}$	$\overline{LACR}$	$\overline{45}$	$\overline{C}$	$\overline{16}$	$\overline{11}$	$\overline{K}$	$\overline{26}$	$\overline{C}$
3	< 4 Ha	*68	*51	TOFA	31	$\overline{TOFA}$	*62	*47	LACR	$\overline{19}$	$\overline{C}$	*$\overline{70}$	$\overline{34}$	$\overline{LACR}$	*58	LACR	*$\overline{61}$	$\overline{27}$	$\overline{TOFA}$	$\overline{42}$	K
4	> 4 Ha	*61	*78	TOFA	48	$\overline{LACR}$	39	*68	C	$\overline{36}$	$\overline{C}$	*$\overline{70}$	$\overline{19}$	$\overline{LACR}$	*$\overline{69}$	C	46	43	TOFA	$\overline{01}$	TOFA
5	All Farms	15	31	TOFA	13	LACR	18	33	C	$\overline{17}$	$\overline{C}$	$\overline{38}$	$\overline{24}$	$\overline{LACR}$	$\overline{42}$	TOFA	$\overline{13}$	$\overline{07}$	$\overline{K}$	$\overline{23}$	$\overline{C}$

- Negative with coef controlled with va
C Size of cult. land (Ha)
OX Value of oxen
LU Labour units
CU Consumer units
CULU Consumer/labour
TOFAEXP Working capital
K Total capital
LACR Labour input
AC All controlled
var Variables
cc Partial Coor. Coef

Chayanovian hypothesis, it is the change in farm technology and associated new inputs rather than labour per se which enhanced the productivity of capital. While actual labour input is negatively correlated (table 23b column 21) with the productivity of TOFAEXP, it is so at a much higher level than under 7 (productivity of oxen). The correlation with consumer unit and consumer worker ratio is negative and significant in most cases.

9. The Productivity of Capital (PKGIC2-K) and Family Resources (tables 24a-b)

There is a positive correlation between the productivity of capital and labour unit in all peasant households (tables 24a, column 14). However, whereas these are insignificant in almost all cases, the correlation with cultivated land (C) is positive (table 24a, column 4) and significant.

As could be discerned from the models in sections 4 and 5, the proxies used for the inequities among the peasantry, gross income and income per consumer unit are more positively and significantly correlated with cultivated land and oxen in villages 1 and 2 and working capital in villages 3 and 4 than with the demographic factors. The analysis was therefore extended to examine the relation between cultivated land (C), oxen(OX) and working capital (TOFAEXP) with the demographic variables - labour unit, consumer unit and consumer worker ratio and other family resources respectively.

Table 25 Cultivated Land (C) and other Family Resources

SL NO	Operational Unit	OX			LU			CU			CULU		
		AC	H	L	AC	H	L	AC	H	L	AC	H	L
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Villages 1&2	75	61	53	69	27	36	70	40	08	62	02	35
2	Villages 3&4	01	01	15	21	21	14	25	15	26	35	36	29
3	<4 Ha	33	14	35	03	09	05	19	45	04	11	10	24
4	>4 Ha	16	12	21	06	01	23	09	15	23	14	25	10
5	All villages	04	02	05	03	09	05	01	14	02	07	13	07

While the positive correlation between cultivated land (C) and consumer unit (CU) and labour unit (LU) is significant in villages 1 and 2 (Table 26, row 1, columns 3,6 and 9), it is so only with oxen. In villages 3 and 4 and holdings of over 4 hectares, the correlations are insignificant and positive or negative (rows 2,3,4, columns 3,6,9,12).

11. Oxen and other Family Resources[29]

Table 26 Oxen and other Family Resources

SL NO	Operational UNITS	C			LU			CU			CULU		
		AC	H	L	AC	H	L	AC	H	L	AC	H	L
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Villages 1&2	25	61	53	68*	61	17	67*	25	31	57	*94	55
2	Villages 3&4	01	01	15	10	74	08	33	78	34	19	54	20
3	<4 Ha	33	14	35	26	82	28	65*	91	63	37	44	29
4	>4 Ha	16	12	21	35	38	20	30	33	29	31	29	11
5	All villages	04	02	05	08	65	08	29	71	29	14	32	15

29 In tables 26, 27 and 28 only 'the all controlled' are considered for analysis as we require the correlations of the demographic factors independent between themselves and the other resource. The effect of other resources has been analysed in sections 4 and 5.

As in 10, oxen is positively and significantly correlated with labour unit in villages 1 and 2 (table 2 , row 1, columns 3,6,9,12). Consumer unit and oxen are negatively correlated in villages 1 and 2 (table 27, row 1, column 9) In the villages which adopted the new technology and holdings of over 4 hectares, the correlations are either negative or positive but insignificant (Table 27, rows 2 and 4, columns 3,6,9, and 12). The overall correlations are also negative or positive and insignificant (Table 27, row 5, columns 3,6,9,12).

12. Working Capital (TOFAEXP) and the other Family Resources.

Table 27 Working Capital and the other Family Resources.

SL NO	Operational Unit	C			LU			CU			CULU		
		AC	H	L	AC	H	L	AC	H	L	AC	H	L
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Villages 1&2	$\overline{14}$	$\overline{19}$	$\overline{25}$	11	17	$\overline{16}$	$\overline{12}$	09	$\overline{19}$	15	23	12
2	Villages 3&4	80*	81	76	08	49	$\overline{07}$	20	52*	$\overline{08}$	$\overline{13}$	34	$\overline{11}$
3	<4 Ha	$\overline{25}$	01	$\overline{27}$	$\overline{28}$	59	$\overline{30}$	47	70*	46	$\overline{28}$	35	$\overline{27}$
4	>4 Ha	85*	85	78*	$\overline{28}$	46	$\overline{36}$	37	67*	16	$\overline{17}$	55	$\overline{01}$
5	All villages	76*	76	74	$\overline{18}$	26	25	24	41	14	$\overline{05}$	37	02

While TOFAEXP (in the new technology input villages) is the most highly correlated variable with the proxies of income (section 4, items no.1 & 2), it is negatively correlated with labour unit and consumer worker ratio in most cases (columns 6 and 12). Consumer unit is positively correlated with TOFAEXP.

3.6 SUMMARY AND CONCLUSION

The farm management data from the 30 households in the four villages during the pre and post technology periods on the one hand and by peasant strata on the other were modelled to attempt to establish the basis of the differentiation of the peasantry in Chilalo. As statistically demonstrated above, Chayanov's hypothesis of high correlations between the income variables (GIC & GICLU) and the demographic variables (Hypothesis 1a-1c, 4-6) do not hold in most cases. When they do, it is mostly in villages 1 and 2 in the pre-new technology period. Even in such cases, however, the hypothesis breaks down when the demographic factors (CU, LU, CULU) are considered independently of land cultivated (C) and oxen (OX). There appears also to be no conclusive evidence to support Chayanov's thesis of a significant correlation between the sources of farm income, labour supply (LU) and return to labour (GICLU & GICLAR) and the demographic factors - consumer unit and consumer worker ratio - CU, CULU (hypothesis 2,3 & 7). While there is inverse correlation between holding size and land productivity (section 5, alternative hypothesis 3 & 4), it is so only for the non technology villages. In villages 3 & 4 which adopted the new technology, with higher labour input and working capital per hectare, the relationship is positive and significant in some cases.

Perhaps his most important formulation of relevance to the "Theory of the Labour Farm", is his assertion about the productivity of capital in peasant farms (hypothesis 8-10). Whereas hypothesis 8 (the productivity of capital and capital) is more obvious, labour input independent of capital is neither positively and significantly correlated with the productivity of land (hypothesis 9) nor its output

increasing effect higher than that of an increase in the capital labour ratio(hypothesis 10). Capital (K,OXEN & TOFAEXP) and the size of holdings rather than potential or actual labour supply in total or per hectare are highly correlated with the proxies of income.

The most consistent, positive and significantly correlated resources with proxies of income are the Le ninist[30] classifying variables of oxen and land in villlages 1 and 2 and the new technology inputs in villages 3 and 4. These variables on the other hand are not to any significant level related to the demographic factors (alternative hypothesis 9-12). In fact in villages 3 and 4, the new technology inputs are negatively correlated with the demographic factors.

30. Lenin, V.I. in The Development of Capitalism in Russsia used horses, oxen, cows, holdings,(allotment) and cultivated land to analyze the process of the social differentiation of the peasantry (Lenin: 1964).

Appendix 5.1

CHILALO VILLAGES STUDY: TABLE OF LEVEL OF SIGNIFICANCE

SL NO	Operational Unit	D.F and PCC			
1	2	3	4	5	6
1	Villages 1 & 2				
2	DF	4	5	6	7
3	PCC (L.S=0.05)N=10	0.73	0.67	0.59	0.56
4	Holdings ≷ 4				
5	DF	9	10	11	12
6	PCC (L.S=0.05)N=15	0.54	0.52	0.49	0.46
7	Villages 3 & 4				
8	DF	14	15	16	17
9	PCC (L.S=0.05)N=20	0.35	0.36	0.39	0.38
10	All Villages				
11	DF	24	25	26	27
12	PCC (L.S=0.05)N=30	0.34	0.32	0.31	0.30
		Vim=4	Vim=3	Vim=2	Vim=1

Vim: Variables in the model

L.S. Level of Significance

D.F. Degree of Freedom

P.C.C. Partial Correlation Coefficient

APPENDIX 5.2 The Main Chayanovian Hypothesis in the Words of Chayanov

Hypothesis 1 : Other things being equal, the peasant worker stimulated to work by the demands of his family develops greater energy as the pressure of these demands becomes stronger. The measure of self-exploitation depends to the highest degree how heavily the worker is burdened by the consumer demand of his family. The force of consumer demand in this case is so great that for a whole series of areas, the worker under pressure from a growing consumer demand develops his output in strict accordance with the growing number of consumers. The volume of the family's activity depends entirely on the number of consumers and not all on the number of workers. p.28

(Table numbered as in Chayanov: 1966, monetary units in roubles and land measurements in destinyas

A.5.3.1

Table 2.9 Annual Income by Labour and Consumer Unit

SL NO	No.of workers (LU)	Consumer (CU)		
		0.0-4.0	4.1-6.0	6.1-X
1	2	3	4	5
1	0-2.9	198	408	542
2	3.0 -3.9	295	367	639
3	4.0 - X	239	427	532

$(\overline{LU},\ \uparrow CU, \Rightarrow\uparrow GIC) > (\overline{CU},\ \uparrow LU, \Rightarrow\uparrow GIC)$

Increase along row > increase along column)

Hypothesis 2 : ... where labour was recorded for each farm separately, enable us to directly measure the influence of an increase in the consumer worker ratio (CULU) on the intensity of peasant family labour. p.78

A.5.3.2

Table 2.8 (p.78) Labour Output per Labour Unit and Labour Input by Consumer Worker Ratio

SL NO	Intensity of Family Labour	Consumer per worker (CULU)			
		1.0-1.2	1.21-1.4	1.41-1.60	1.61-∝
1	2	3	4	5	6
1	Worker's Output	132	152	219	283
2	Working days per worker (GICLACR)	99	102	157	161

↑CULU⇒↑GICLU, ↑GICLACR

Hypothesis 3 and 4 :

Apart from consumption demands, the condition in which labour is applied also determine the workers output to a considerable extent. Thus if we compare the pressure on the workers'output from the amount of land the worker holds for the same starobelskuezd, we get the very significant picture in table 2.10 ...better conditions for the application of labour gave the workers the opportunity to increase their output considerably, and this with an unchanged

consumer worker ratio (CULU) inevitably brought about an increase in family and consumer well being...An increase in annual productivity caused by improved production conditions, however, immediately increases well being. pp.78-79.

Table 2.10 Workers Output Depending on Consumer Worker Ratio and Amount on Land Held

SL NO	Arable Land per worker (LUC)	Output per worker GICLU			Consumer Budget (GICCU		
		CULU (Consumer worker ratio)			CULU		
		1-1.3	1.31-1.60	1.61-X	1-1.3	1.31-1.60	1.61
1	2	3	4	5	6	7	8
1	0.02-2.0	76	106	108	71	75	72
2	2.1-3.0	103	126	137	85	88	73
3	3.1-X	105	129	176	86	86	89

Hyp. 3: $\overline{LUC}$, ↑CULU ⇒ ↑GICLU HYP.4 $\overline{LUC}$, ↑CULU ⇒ ↑GICCU

$\overline{CULU}$, ↑LUC ⇒ ↑GICLU $\overline{CULU}$, ↑LUC ⇒ ↑GICCU

Hypothesis 5 : ...farming incomes rise and fall in parallel with the increase and decrease in land held and can be one of the measures of volume of farm activity. p.93

Sown area consumer ratio (CUC)	0-0.5	0.5-1.00	1.00-X
Workers Output (GICLU)	78	106	192
Sown area consumer ratio (CUC)	0-1.5	1.5-2.5	2.5-X
Workers Output (GICLU)	84	116	151

↑CUC ⇒ ↑GICLU

A.5.3.4
Table 3.1 Output per worker by net sown area

SL NO	Sown Area (C)	Net Product per Worker (GICLU)	Farm Sown Area (C)	Net Product per Worker (GICLU)
1	2	3	4	5
1	3	57	1	43
2	3-7.5	102	1-3	156
3	7.5-15.0	125	3-4	131
4	15	203	4-6	135
5			6	206

A.5.3.5
Table 3.2 Output per worker and Consumer Unit by Net Sown Area

SL NO	Farm sown Area (C)	Net Product per Worker (GICLU)	Farm Sown Area (C)	NetFarm Product/ Consumer GICCU
1	2	3	4	5
1	2	63	5	92
2	2-3	63	5-8	108
3	3-4	61	8-11.5	109
4	4-6	83	11.5-18	120
5	6	80	18	275

↑CUC (Cultivated land/CU)⇒↑GIC

↑CUC⇒↑GICLU

↑CUC⇒↑GICLU

Hypothesis 6: ...the annual intensity of labour declines under the influence of better pay, because to remain the same it is absolutely essential that the productivity of the year's labour (and equally the standard of well being)

should grow in proportion to the increase in the pay of a unit of labour. p.80

A.5.3.6

Table 2.12 Labour productivity by income per consumer unit and Labour Input

Payment of working day on farm in Franc (GICLACR)	0-2	2-3	3-4	4-5	5-∞
Personal Budget (GICCU)	610	699	804	839	886
LACR (Labour supply)*	610	279	229	186	177

↑GICLACR⇒↑GICCU; ↓LACR

* Our derivation: per consumer income divided by midpoint of daily wage.

Hypothesis 7:...the family holding a greater and greater quantity of capital naturally develops a greater and greater volume of agricultural activity. On the other hand, the table equally clearly shows that as the peasant family's workforce inceases, it succeeds in developing a greater and greater volume of agricultural activity with the same amount of capital, covering its lack of capital by its labour intensity. In this instance we see that capital is not an arithmetic determinant of volume of activity but merely one of the conditions in which the family determines this. pp.95-96.

A.5.3.7

Table 3.5 Influence of Capital (K) and Family Size (LU) In Farm Area (C)

SL NO	NO Workers in Family	Family Fixed Capital (K) Roubles				Family Fixed Capital (K) Roubles			
		0-500	501-1000	1000-1500	1500	0-500	500-1000	1000-1500	1500-
1	0-2	1.7	2.1	-	-	3-4	3.6	-	-
2	2-4	2.3	3.3	4.5	5.1	3.1	4.6	7.7	8.1
3	4-✗	2.9	3.7	5.1	6.9	4.6	6.1	8.6	14.1

$\overline{LU}$, $\uparrow K \Rightarrow \uparrow C$

$\overline{K}$, $\uparrow LU \Rightarrow \uparrow C$

Hypothesis 8: ... with the amount of capital remaining the same as the family increases, its workers are in a worsening situation as regards availability of fixed capital. By comparing ... the fall in the amount of the means of production available to him, we can observe that the fall in sown area per worker takes place more slowly than the fall in capital available to him.... the reduction in the means of production influences the volume activity, not mechanically but by affecting the basic economic equilibrium, and makes the worker reduce his output due to the increasing drudgery of his work...lead to a reduction in the family's well being, i.e. lower the degree of satisfaction of its demands (consumer budget)... thus at the cost of reducing labour

productivity of the annual family as it increases in size, it is possible with the same amount of capital to increase the volume of agricultural production. pp.96-97.

A.5.3.8
Table 3.6 Influence of Family Size (LU) and Fixed Capital (K) on Sown Area (C) (Desyantinus) per worker

No of workers in Family (LU)	Fixed Capital (K)				Fixed Capital (K)			
	0-500	500-1000	1000-1500	1120-X	0-500	500-1000	1000-1120	1000-X
0-2	1.5	1.17	-	-	1.91	2.02	-	-
2-4	0.83	1.01	1.35	1.66	1.01	1.48	2.49	2.53
4-X	0.56	0.75	0.89	0.98	0.94	1.23	1.56	2.38

A.5.3.9
Table 3.7 Capital (K) and Sown Area per Worker by Family Size

No of workers in family(LU)	Cap (K)	Sown area (C)	Cap (K)	Sown area (C)	Cap (K)	Sown area (C)	Cap (K)	Sown area (C)
0-2	100	100	100	100	-	-	-	-
2-4	65	82	85	87	100	100	100	100
4-X	38	55	42	64	60	60	45	54

A.5.3.10
Table 3.8 Satisfaction of Personal Demands (Consumer Budgets) by Family Size and Amount of Fixed Capital (Roubles)

No of workers per family (LU)	Fixed Capital (K)				Fixed Capital			
	0-500	500-1000	1000-1500	1500-X	0-500	500-1000	1000-1500	1500-X
0-2	93	143	-	-	90	100	-	-
2-4	68	75	104	153	86	97	114	124
4-X	52	79	83	125	76	85	92	124

Table 3.10 Gross Income per Family worker by Family Size and Amount of Fixed Capital

No of workers per family (LU)	Fixed Capital				Fixed Capital			
	0-500	500-1000	1000-1500	1500-∝	0-500	500-1000	1000-1500	1500-∝
0-2	216	293	-	-	192	306	-	-
2-4	154	168	244	364	140	229	420	441
4-∝	102	142	176	194	135	177	222	454

i $\overline{K}, \uparrow LU \Rightarrow \downarrow C/LU$ ($\uparrow LUC$) $\Rightarrow \uparrow NFICRU$, $\downarrow GICLU$: Tables 3,6,3.8 & 3.10

ii $\overline{LU}, \uparrow K \Rightarrow \uparrow C/LU$ ($\downarrow CUC$) $\Rightarrow \uparrow NFICRU$, $\uparrow GICLU$: Tables 3.6,3.8 & 3.10

iii $[(\overline{K}, \Delta LU \Rightarrow \Delta C/LU, \Delta NFICRU, \Delta GICLU)] > [(\overline{LU}, \Delta K \Rightarrow \Delta C/LU, \Delta NFILRU, \Delta GICLU)]$

Table 3.7

Hypothesis 9 & 10:...as family labour force and the relative labour intensification of the farm increases it becomes possible for the family to extract a greater and greater amount of gross income from each unit of capital. On the other hand...we see that as the capital intensification of the farm grows and its relative labour intensification falls the productivity of capital expenditure continually declines ...we see that in the case of gross income the size of sown area per 100 rouble fixed capital falls as the capital's intensity increases. By forcing up its labour intensification, the peasant family is in a position to make fuller use of the capital at its disposal the less it has. pp.98-99.

A.5.3.12
Table 3.11 Gross Income per one hundred Roubles of Fixed Capital by Family Size and Amount of Fixed Capital

No of workers in family	Fixed Capital				Fixed Capital			
	0-500	500-1000	1000-1500	1500-∝	0-500	500-1000	1000-1500	1500-∝
0-2	116	84	-	-	-	65	-	-
2-4	126	83	69	53	117	94	107	59
4-X	142	96	82	63	155	126	108	124

A.5.3.13
Table 3.12 Sown Area (Desyantinas) per One Hundred Roubles of Capital (C/K)

No of workers per family	Fixed Capital				Fixed Capital			
	0-500	500-1000	1000-1500	1500-∝	0-500	500-1000	1000-1500	1500-∝
0-2	0.34	0.33	-	-	-	0.43	-	-
2-4	0.68	0.50	0.38	0.24	0.84	0.61	0.65	0.34
4-X	0.78	0.51	0.42	0.31	1.08	0.87	0.75	0.65

$\overline{LU}$, ↑K⇒↓PKGIC, ↓C/K Tables 3.11 & 3.12

$\overline{K}$, ↑LU⇒PKGIC, ↑C/K TAbles 3.11 & 3.12

Hypothesis 11:... influence of family growth and of increase in capital intensity...family growth gives a most clearly expressed reaction. Comparing it with the development of the factor, we ought to acknowledge, as we would theoretically, expect that the increase in the volume of activity proceeds almost in proportion to family growth and lags far behind the rapidity of the development of capital intensification,

which we have already seen in analyzing the previous combination. pp.99-100

A.5-3.14

Table 3.13 Total Family Income in Relation to Fixed Capital per Worker (Roubles) and Family Size

No of Workers in family (LU)	Fixed Capital per Worker			
	0-100	100-200	200-300	>300
0-2	169	352	426	528
2-4	334	478	579	835
4	523	749	923	1584

$(\overline{K/LU},\ \uparrow LU \Rightarrow \uparrow GIC) > (\overline{LU}, \uparrow K/LU \Rightarrow \uparrow GIC)$

Δ within columns $>$ Δ within rows

CHAPTER FOUR

4.1.1 INTRODUCTION

Agricultural development and the new technology in Asia in their wider social and economic parameters are characterized by social formations with a considerable alienation of land, the prevalence of articulated agrarian social classes; high labour land ratio and multiple cropping with irrigation as the leading input (Chadha:1983; Byres: 1972; Griffin:1977,1979). With the diffusion of the new technology, the increasing proletarianization of the peasantry, accumulation by capitalist farmers from "above" and the emerging agrarian bourgeoisie among the peasantry have led to increased agricultural growth rates, marked rise in land and labour productivity.

The high capital labour ratio in the non-agrarian sector, the limits posed by the cultivable frontier and population growth have slowed down the capacity of the non-agricultural sector of the national economy to absorb the 'surplus'of the agricultural proletariat and the marginalized peasantry thereby retardi ng the pace of agrarian transition and industrialization albeit along the capitalist path. Nonetheless, the Indian mode of production debate in agriculture in relation to the new technology is centred on whether capital has completely subordinated agriculture or capitalism is firmly in the process of developing within a predominantly non-capitalist mode.

By contrast, for most of sub-Saharan Africa, the new technology has been an "Asian Drama". The communally owned but privately used land over most of Africa (Cliffe:1974; Howard:1981; Saul:1973; Hyden:1981), the low base level of the productive forces and the extensive use of land

pose precapitalist agrarian class formations, a resource base more constrained by labour in the problematization of its basis for accumulation and agrarian transition. Sub-Saharan Africa's agrarian social formations suggest more acute problems of accumulation at the level of the economy but wider possibilities for a socialist transition at the level of politics and the state arising from the relative autonomy* of the state from the historical social classes

The case of Arsi with which we are concerned in this chapter amply demonstrates a breakthrough by the new technology in overcoming the initial problem of accumulation both through increased land productivity with the new technology and a considerable expansion of the land frontier in rainfed agriculture. The diffusion of the new technology based on the process of the peasantization of the hitherto semi-nomadic population and the social differentiation of the pre-technology period peasantry suggest wide opportunities in a combined leap in agricultural technology and output given the macro-economic settings in infrastructure, pricing, and the provision of incentive goods. A beginning towards a rapid transition from the tributary to the capitalist mode of production in agriculture was well on its way prior to the 1974 Revolution. The abolition of ground rent and its replaceme nt by a lower rate of land use fee, the redistribution of holdings (at the expense of the capitalist farmers and rich peasants) and the attempted efforts towards the socialization of agriculture bring to the fore the problems of socialist agrarian transition in African agrarian social formations especially in the articulation of transitional relations of production given

* For its relation in the context of agrarian transition and development, see Marx:1970; Alavi:1972; Saul:1979

In this chapter, we analyze the use of the new technology in agriculture, the increased micro and macro level analysis of productivity, the process of social differentiation it set in motion (1966-1975),the basis towards the capitalist mode of agriculture, the reversed trend towards middle peasantization in 1975-1980 and its implications for income distribution and accumulation.

Within the broader context of the mode of production in Ethiopian agriculture, the agrarian structure and the level of the marketed surplus discussed in chapter two (section six), section two discusses how these relate to Arsi. This is followed by a quantification of the new technology inputs and the estimates of output in 1966-1980. Section four utilizes simple regression models to locate the sources and extent of the rapid agricultural output and factor productivity (land, labour, traditional and new technology) inputs. It also provides a comparative cost of ox/labour and tractor/combine technology. Section five examines the process of social differentiation of the Arsi peasantry, its basis in the forces of production in the pre and post technology and agrarian reform period.

The final section analyzes the combined effect of the technology and agrarian reform upon the marketed surplus in Arsi agriculture and their implications for employment, distribution of income, the process of class formation and accumulation within Arsi and Ethiopia at large. The analysis consistently tries to compare the pre-technology (1967-1975) and the post-technology, post-agrarian reform (1975-1980) period and their further disaggregation between Chilalo where the technology was introduced prior to the redistribution agrarian reform and Arbagugu/Ticho which experienced both the new technology and the redistributivist agrarian reform since 1975. (See charts)

2 AGRARIAN STRUCTURE AND THE MARKETED SURPLUS IN ARSI IN 1966

Like most of the Southern part of Ethiopia, Arsi was incorporated into the Ethiopian Empire towards the closing years of the 19th century (Chapter three, section 2). The original inhabitants, the Arsi Oromo,[1] communally used most of the land for grazing. In a pre-project field survey, reconstructing the agrarian system from oral tradition, Lexander concludes that:

> "It was much later under the influence of the Amaras that the Arussi[2] Gallas[2] learned how to use the plow and to utilize the land to a higher extent. As late as at the beginning of the 20th century, the land was still used for this purpose (grazing) " (Lexander: 1968, p.11).

With large scale movement of soldiers and semi-soldier peasants in the post-Italian occupation period,[3] more and more of the Arsis were sedentarized - a process which was still going on at the time of introduction of the new technology. Concurrently, following the change in the mode of surplus extraction from tribute in kind to cash and a concerted effort towards standardized taxation in the post-occupation period, privatization of land was accelerated.[4] As late as 1931, there was no market in land (Lexander: 1968, p.11).

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1. The influx of settlers from northern and western parts consisted not only of Amaras, the dominant nationality in Ethiopia, but also others such as Oromos from northern Shewa (Lexander: 1968; 1970).
2. The respective inhabitants identify themselves as Arsi and Oromo respectively.
3. This process was described in more detail in chapter 3.
4. The process by which 'tribute'areas were converted into 'private'lands in most cases to the exclusion of the peasantry,proto-peasantry and the semi-nomadic population in the South in the post-occupation period is nowhere well documented.For some hypothesis see Stahl 1974:pp. 60-63; McLellan: 1978

By the time the CADU project commenced in 1966-67, legal entitlement to land had probably been established over most of the land in Chilalo Awraja by the soldiery, the local chiefs and other functionaries of the Ethiopian state. A survey in the four districts which were subject to early colonization and where the CADU project started its activities showed that of the land registered for tax purposes, 76.2% was classified as "gebbar" (owners paid tax directly to the state), 10.1% as "mirt" or "sisso" (land ownership bestowed on local chieftains who also received tax concessions for their service to the state). The rest, 16.7% was held by the church and/or the state (Lexander: 1970, p.7). In a later study for the whole of Chilalo, nearly 91.5% of the measured land was fully privatized (Cohen: 1975, p.340). Land distribution and privatization , however, were largely to absentee owners. The process of sedentarization/peasantization by Arsis and others took varied forms of share cropping tenancy[5] (Lexander: 1970,p.7). In 1970, 50% of the registered land belonged to absentee landowners who comprised only 7.8% of the estimated 5,640 owners (Lexander: 1970, p.7; CSO: 1966, p.18).[6] With an average holding size of 57.6 hectares, the holding of the upper stratum of the owners may well have ranged over 100 hectares. While ownership of land was concentrated in the hands of absentee "proto-landlords", Arsi was undergoing both peasantization and

5. On the contribution of input between tenant and landowner from the gross share of output, see chapter four. Appendix 2, Table 11.

6 Deduced from percentage of absentee owners (Lexander: 1968) and number of owners (CSO: 1966, p.17-19) and the size of land registered for tax purposes (Anselm Bo: 1972, p.4).

stratification. Within the very small size of holdings and the numerical dominance of the poor peasantry in Ethiopia as a whole, the Arsi proto-peasantry especially those in Chilalo had relatively more middle peasants,[7] stratified with high : land ratio compared to the agrarian systems 1 and 2 (chapter four, section 4).

Table 6.1 The Comparative Distribution of Peasant Strata in Arsi and Ethiopia in 1966

No	Strata/ Size of Holding Ha.	Percentage of Holdings				Percentage of Hectares			
		Chilalo	Agg/Ti	Arsi	Eth.	Chilalo	Agg/Ti	Arsi	Eth.
1	(LL) 0 (RP)	18.4	12.6	15.7	12.4				
2	(0-1) LMP	13.1	40.8	26.1	58.4	3.2	23.1	9.9	25.5
3.	(1-3) UMP	43.2	30.2	37.1	24.1	41.8	52.6	45.4	40.3
4	(3-5) MP	20.4	14.6	17.7	3.6	35.7	24.3	31.9	13.6
5	(1-5)	(63.6)	(44.8)	(54.7)	(27.6)	(77.5)	(76.9)	(77.3)	(53.9)
6	(RP) 5	4.9	2.0	3.4	1.5	19.2	23.1	22.7	20.5
7	TOTAL	100	100.2	100	100	99.9	100.0	99.9	99.9

Source: Compiled from Imperial Ethiopian Government (IEG), Central Statistical Office (CSO) A Survey of Arsi Province and others. CSO, Addis Abeba, 1966-68, Arusi pp. 17-19.

7 For the basis of the classification schema, see chapter 4 section five.

Table 6.2 Chilalo: Status of Land Classified for Tax - 1970[8]

SR No	Category	Ha	Percentage of classified	Percentage of Total	Hec/House-Hold
1	2	3	4	5	6
1	Fertile	432,800	66	43	7.2
2	Semi-fertile	144,100	22	14	2.4
3	Poor	74,300	12	7	1.2
4.	Sub-total	650,400	100	65	10.8
5	(Cultivated)	(148,000)			
6	Unclassified	359,600		35	6.0
7	Total	1,010,000		100	16.8

Source: Anselom Bo. Crop Production and Animal Production: Comparative Study on the Possibilities for Different Farm Produce in Chilalo Area in Ethiopia, Minor Research Task at CADU No. 6, Assela, 1972 p.4.

At the onset of the new technology, the agrarian structure consisted of agricultural labourers, artisans, poor peasants, middle and rich peasants and a few but growing number of proto-capitalist (mechanized) farmers.

Landless (18.4%) (Agricultural labourers, artisans, traders) Despite the relatively high supply of uncultivated but cultivable land in relation to Ethiopia, a higher percentage of households without holdings (see chart 6.1). In a period prior to large scale mechanization and the new technological inputs, the slightly higher rate may be due to a more

8. The basis of land classification appears to have been neither the potential or actual capacity of the land nor income derived as rent but rather the density of population and therefore of the extent of tribute in the form of surplus (Mahteme Sellassie: 1950/51).

advanced division of labour (artisans, merchants etc.) and migrant labourers enhanced by the relative prosperity of the region where the percentage proportion of the stratum of the rich peasant class was more than five times for the country as a whole or the incidence of semi-nomads with dwellings and no holdings.[9]

Poor Peasants (13.1%)

Whereas poor peasants made up 58.4% of the agrarian households for the country as a whole, the proportion for Chilalo was less than a quarter of the national average. Most of the households had no oxen (CADU: 1972, pp.60-62). IN Arbagugu, on the other hand, the size of this stratum is higher than Chilalo (chart 6.1).

Middle Peasants Unlike for Ethiopia as a whole where the poor peasant stratum is the most numerous, middle peasants are by far the majority in Arsi and the more so in Chilalo.

Rich Peasants (4.9%)

Although the smallest section, they cultivated nearly four times the proportionate share of their households.

Proto-Landlords Absentee "landlords" which made up 7.8% of the estimated owners held about 50% of the land in Arsi.

Cereals made up 80% ofthe acreage and 87% value of crop output respectively with barley and wheat alone accounting for 70% the value of output as shown in the following table.

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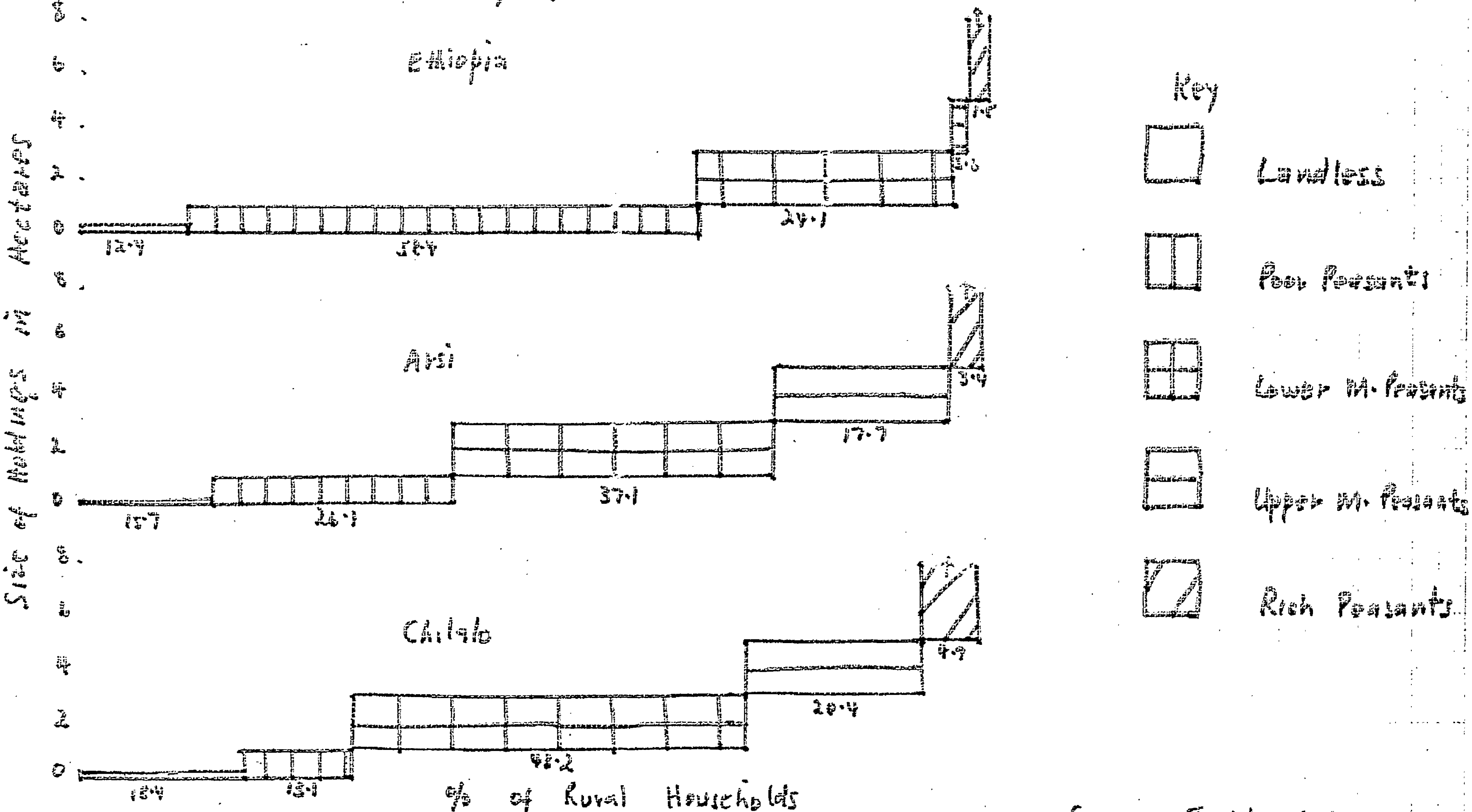
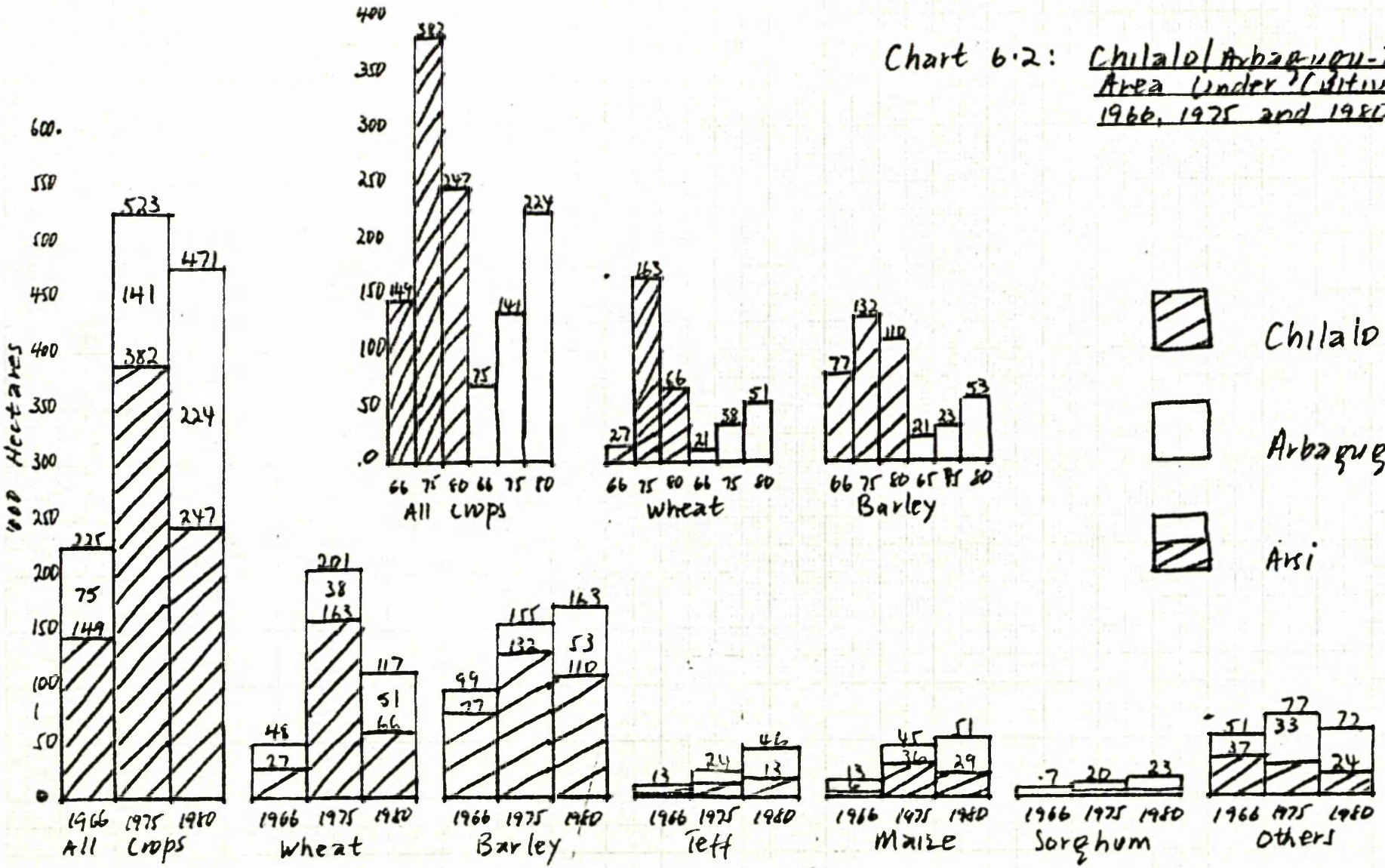
9. The Arsi practised transhumance known as 'godantu'. They maintained settlements and nominal plots on the highlands with more and reliable rainfall as their base for grazing in the dry season in the adjacent Rift valley (where the rainfall is much less and less reliable) during the cold and wet season (own observation working in Cadu).

Chart 6.1: Comparative Holding Size Distribution in Ethiopia, Arsi and Chilalo in 1966



Source: Table 6.1

Chart 6·2: Chilalo/Arbaguqu-Ticho/Arsi: Area Under Cultivation in 1966, 1975 and 1980



Source: Tables 6·3, 6·11, 6·15, 6·16

Table 6.3 Acreage and Value of Crop output in Arsi in 1966[191] at 1971[10] prices.

SL No	Crops	Ha in 1000	Yield Qtls/ Ha	1971 Prices Birr/ Qtl.	Value in Mill. Eth. Birr	
					$	%
1	2	3	4	5	6	7
1	Wheat	50.0	9	22	9.9	27.9
2	Barley	100.5	10	15	15.0	42.5
3	Teff	13.7	7	27	2.7	7.5
4	Maize	13.4	13	19	3.3	9.2
5	Sorghum	0.5	12	17	0.2	0.4
6	Sub-total	178.1			31.1	87.5
7	Chickpea	0.3	6	26	.1	-
8	Beans	9.5	8	13	80.8	2.3
9	Peas	12.0	6	15	1.1	3.0
10.	Flax	25.1	4.5	22	2.5	6.9
11	Lentils	0.4	3.1	29	0.1	-
12	Others	0.1		-	.1	-
13	Total	225.1			35.8	99.9

Source: IEG, CSO A Survey of Arsi Province: CSO, 1966 pp.17-19 and Provisional MIlitary Government of Socialist Ethiopia (hereafter PMGSE) and UNDP/FAO Data Book on Land Use and agriculture in Ethiopia Vol. 1 and 2, Addis Abeba, Oct.1982 p.240. See chart 6.2 for breakdown between Chilalo and Arbagugu/Ticho; For prices, Study of Farm Households in the Assela Area. CADU, 1972, Assela, p.45.

10. In the analysis of output and inputs prices, 1971 was selected in view of its mid-position for the period between 1966 (at the onset of the new technology inputs) and the Agrarian Reform of 1974/75 after which agricultural product prices have soared at phenomenal rates as we shall see in section 6.

Although Arsi was a mixed farming area with income from non-crops (mainly animal products) amounting to 20% in the new technology surveyed villages (section six), we have below estimated the level of crop output and its distribution by obligatory surplus, consumption and commercial surplus.

Table 6.4 Arsi: Estimates of Output, Tax, Rent, Consumption and the Marketable Surplus of Cereals by Peasant Strata in 1966 in 1000 of tons[11]

a) Total

SL NO		PP	LMP	UMP	MP	RP	TOTAL
1	2	3	4	5	6	7	8
1	1.0 Total Output	18	85	60	(45)	(24)	187
2	2.0 Taxes	1	3	2	(5)	1	7
3	3.0 Rent	3	14	10	(24)	4	31
4	4.0 Obligatory Surplus (2+3)	4	17	12	(29)	5	38
5	5.0 Gross Disp.for Cons.(1-4)	14	68	48	(116)	19	149
6	6.0 Effective Cons. Dem.	14	47	26	(73)	7	94
7	7.0 Minimum Cons. Dem.	23	47	26	(73)	7	103
8	8.0 Commercial Surplus (5-7)	-9	22	21	(43)	12	56
9	9.0 Total Marketable Surplus (4+8)	-5	38	32	(70)	18	83

b) The Percentage of each (Output, Consumption, Surplus etc.) by Peasant Stratum: Each row = 100

1	1.0 Total Output	10	45	32	(77)	13	100
2	2.0 Taxes	14	43	28	(71)	14	99
3	3.0 Rent	10	45	32	(77)	13	100
4	4.0 Obligatory Surplus	11	44	31	(75)	14	100
5	5.0 Gross Disp. for Cons.	9	45	32	(77)	13	99
6	6.0 Effective Cons. Dem.	15	49	29	(78)	7	100
7	7.0 Min. Cons. Demand	22	44	26	(70)	8	100
8	8.0 Commercial Surplus	-17	39	38	(77)	23	100
9	9.0 Marketable Surplus (4+8)	-5	43	37	(80)	20	100

11. Result of 1984 census projected by 2.6% annually backwards with a population of 1,024,000 in 1966 and 165,200 households at 6.2 persons per household, area cultivated yield value of output by peasant stratum as per tables 6.1 and 6.3

c) The Percentage Distribution of Output by Obligatory Surplus, Consumption and Marketable Surplus in each Peasant Stratum Each Column = 100

1.	1.0 Total Output	100	100	100	100	100	100
2	2.0 Taxes	3	3	3	3	3	3
3	3.0 Rent	17	17	17	17	17	17
4	4.0 Obligatory Surplus	20	20	20	20	20	20
5	5.0 Gross Disp. for Cons.	77	80	80	(80)	79	80
6	6.0 Effective Cons. Dem.	77	55	46	(51)	27	51
7	7.0 Min. Cons. Dem.	127	55	46	(51)	27	55
8	8.0 Commercial Surplus	-50	25	35	(29)	52	29
9	9.0 Marketable Surplus	-23	45	54	(49)	72	47

The marketable surplus of cereals was nearly half of the total output compared to 37% in Ethiopia (chapter four section six). As in Ethiopia as a whole, while the total marketable surplus was nearly equally divided beween the obligatory and the commercial surplus, middle peasants made up for 80% of the total marketable surplus in Arsi compared to only 25% in Ethiopia, the rest mainly coming from poor peasants) indicating the relative base period prosperity in Arsi compared to Ethiopia as a whole.

At the onset of the new technology, the Arsi rural economy was undergoing a process of peasantization and stratification based on the ownership of oxen and cattle The hitherto communally owned grazing lands of the Arsi were being owned by the tributary state's functionaries who were in transition to proto-landlords and the local 'balabats'.[12] 20% of the crop output was rental and tax surplus (17% share cropping and 3% land, education and health tax). The commercial surplus (the marketed output net of the surplus obligation of the peasantry but includ-

12 Local chiefs

ing farm input which was negligible) which may be equated with the demand of agriculture and its product contribution to non-agriculture was 29% of the output of which 77% was accounted for by the middle peasants.

4.5 3 THE COMPONENTS OF THE NEW TECHNOLOGY INPUTS AND ESTIMATES OF AGRICULTURAL OUTPUT IN 1966-1980

The CADU/ARDU new technological inputs mainly consisted of fertilizer and to a lesser extent seed (wheat), AI (Artificial Insemination) services, cross heifer cattle in rainfed peasant agriculture. In the following tables, we present the distribution of the new technology inputs, the number of peasants participating in the project and the CADU/ARDU assisted rural institutions, marketing and cooperative services.

Table 6.5 CADU/ARDU supplied Biological New Technology Inputs, Number of Participant Peasants in 1967/68 - 1979/80 (three years centred moving average) and the Development Cost of the Project

SL No	Year	Fertilizer		Seed		Actual Participant Households				Planned Participants		
		Qtls '000	Index 74/75=100	Qtls '000	Index 74/75=100	No. of HH '000	Index 74/75=100	% of Total HH	Qtl of Fert/ HH	No. of HH '000	Difference (7-11)	Cost of Service in Mill Birr
1	2	3	4	5	6	7	8	9	10	11	12	13
1	67/68											
2	68/69	7.2	11	5.3	47	1.9	5	0.9	3.8	0.1	1.8	7.7
3	69/70	21.2	33	10.2	90	6.6	16	4.6	3.2	1.0	+5.6	5.1
4	70/71	35.3	54	13.6	120	10.4	25	13.4	3.4	4.0	+6.9	6.7
5	71/72	42.5	65	11.6	103	13.3	32	11.5	3.2	8.0	+5.3	3.2
6	72/73	52.0	80	7.6	67	17.0	41	12.0	3.1	14.0	+3.0	NA
7	73/74	56.8	87	6.5	57	26.8	65	22.2	2.1	22.0	+4.8	4.0
8	74/75	64.9	100	11.3	100	41.4	100	36.0	1.6	30.0	+11.4	4.1
9	75/76	70.5	109	16.8	149	49.7	120	23.0	1.4	36.0	+13.7	5.6
10	76/77	73.3	113	22.7	201	57.4	139	26.0	1.3	40.0	+17.4	NA
11	77/78	75.5	116	22.5	199	58.7	142	24.0	1.3	42.0	+16.7	NA
12	78/79	75.6	116	22.5	199	65.3	158	28.0	1.2	43.0	+22.3	NA
13	79/80	76.9	118	18.3	162	65.1	157	27.0	1.2	44.0	+21.1	NA
14	80/81											

Sources: Col.3&5 & Col.7-9, Negussie W. Michael Agrarian Reform in Ethiopia: A Review, ARDU Publication No.25, Feb. 1984 pp.55,56,60 and Solomon Bekure, Bengt Nekby, Karl-Axel Hansson, Harald Linder, Carl Moritz Wallgren & Sarah McPhee, Evaluation of the Arsi Regional Development Unit (ARDU), Sept. 1981, Appendix VII 4 Table 27; Col. 11 CADU, On the Establishment of a Regional Development Project in Ethiopia, SIDA, CADU Publication No.1&2 p.14.5. Cost of CADU/ARDU development services, CADU Annual Reports 68/69-71/72, 73/74-75/76 pp.47,64,59,66,94,52,64 respectively.

HH = Households NA = not available

Table 6.6 CADU/ARDU Supplied New Technology Services (Heifers & Artificial Insemination) Supporting Physical (Rural Roads) and Social (Extension) Services by Crop Year

SL NO	YEAR	NO. OF HEIFERS	A.I. SERVICES	RURAL ROADS (built (Kms)	NO. OF EXT Areas (Cum)
1	2	3	4	5	6
1	71/72	9	478	35	
2	72/73	6	585	-	
3	73/74	5	927	46	
4	74/75	17	946	-	31
5	75/76	101	436	-	
6	76/77	N.A.	178	44	
7	77/78	N.A.	318	23	
8	78/79	662	1,344	69	
9	79/80	278	1,535	76	
10	80/81	431	3,833	37	56
11	Total	1,509	10,580	330	

A.I. = Artificial Insemination

Ext. = Extension

Source: as in Table 6.5

Table 6.7 The Mechanical New Technology Inputs (Tractors and Combine Harvesters) and Number of Mechanized Farmers in Arsi in 1966 and 1972

SL NO	Measures of Mechanization	1966	1972	Index:1966=100
1	2	3	4	5
1	Area under Mechanization (Ha)[13]	2,000	30,000	1,500
2	No. of Tractors	20	255	1,270
3	No. of Combine Harvesters	4	53	1,300
4	Mechanized Farmers	20	119	600

13 This was a countrywide phenomenon. Between 1963 & 1964, the incremental number of duty free tractors was 25, rising in the 1965/66-1969/70 period to 356 per year (Henock: 1972, p.27).

Source: Henock, K. Investigation into Mechanized Farming and its Effect on Peasant Agriculture CADU 1972, Assela 1971 p.35 and Cohen, J.M. Rural Change in Ethiopia: A Study of Land, Elites, Power and Values in Chilalo Awraja, Ph.D. Thesis, Boston University, 1973, p.199.

The distribution of the most important input, fertilizer, increased more than three times between 1969/70 and 1974/75. Following the redistributivist agrarian reform and the inclusion of Arbagugu/Ticho, the increase in the rate of participants was much smaller than the pre-reform period in Chilalo. The average per participating peasant use of fertilizer declined from over 3 quintals in the initial years to 1.2 quintals in the late seventies. Although the CADU/ARDU project was targeted to small farmers of the lower income bracket (CADU: 1967), the spread of the new technology inputs initiated by the project was accompanied by increased mechanization and its encroachment on peasant holdings/grazing lands and the semi-nomadic lands of the Arsis. Most of the improved seed produced by the project, planted in conjunction with fertlizer was that of wheat.[14]

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14. The price of wheat (1.5 times that of the main crop barley), the development of wheat seed, its replication and its response to fertilizer prompted the increased yield and expansion of wheat as we shall see later.

Table 6.8 The Proportion of Area under Cultivation (%) by Type of Crop and Seed Variety in Chilalo in 1975

SL NO	Type of Crop	% of area under local variety	% of area under Improved variety		% of Total area under each crop	Mean ha. per holding
			% of Total	% of Improved Variety		
1	2	3	4	5	6	7
1	Wheat	3.7	28.5	89	32.2	1.0
2	Barley	31.7	-		31.7	1.2
3	Maize	12.1	2.5	8	14.6	1.2
4	Teff	3.9	0.6	2	4.5	0.6
5	Sorghum	1.4	-		1.4	0.4
6	Total	52.8	31.6		84.4	4.4
7	Others	13.0	0.4	1	13.4	
8	Total	65.8	32.0	100	97.8	

Source: Gill, Gerald Seasonal Employment and Technological Change on Small Holdings in Chilalo, Ethiopia Ph.D. Thesis, University of Strathclyde 1978, p.89.

15. Although on a regional level, taking the participation rate of nearly one third of the peasant households in fertilizer (table 6.5) which was the new technology input par excellence in the peasant farms, this compares with India as a whole in the early eighties in which one third of the total cereal area was under 'modern varieties' with 72.1% of wheat, 38.8% of rice, 20.5% maize and 23.6% of jowar. Prahladachar, M. "Income Distribution Effects of the Green Revolution in India: A Review of Empirical Evidence" in World Development Vol.II No.11 1983 pp.927-944.

Table 6.9 CADU/ARDU Purchases of Grain and Milk from Peasants in 1967/68-1973/74 and 1979/80-1981/82

SR NO	CROP YEAR	GRAIN			MILK		
		Qtls	Birr* Value	Index of Qtls '74/75=100	NO OF Litres	Value *	Index of litres 74/75=100
1	2	3	4	5	6	7	8
1	67/68	6,300	0.1	3	10,547	2.1	3
2	68/69	7,140	0.1	3	146,087	29.2	45
3	69/70	30,600	0.5	13	311,399	62.3	96
4	70/71	104,000	1.8	49	164,900	32.9	51
5	71/72	43,500	0.7	19	147,113	29.4	46
6	72/73	125,000	2.1	57	262,999	52.6	81
7	73/74	220,000	3.7	100	323,017	64.6	100
8	79/80	350,000	6.0	162	-	-	-
9	80/81	361,000	6.1	165	-	-	-
10	81/82	642,831	10.9	311	-	-	-

1973/74 = 100
*Mill. of Birr

Source: Negussie W. Michael: Agrarian Reform in Ethiopia: A Review, ARDU Publication No. 25, February 1984 p. 61. Value for grain computed on the weighted index of the main cereals of $17 Birr/Quintal (See Table 6.3 for 1971 prices) and milk at 20 cents per litre.

Table 6.10 CADU/ARDU Rural Institutions in 1977/78-1979/80

SR NO	RURAL INSTITUTIONS	77/78	78/79	79/80
1	2	3	4	5
1	Peasant Associations	1,116	1,120	1,105
2	Women Associations	1,720	na	1,076
3	Youth Associations	na	na	1,076
4	Peasant Assoc.Members	294,746	na	307,810
5	Women Assoc.Members	na	na	238,564
6	Service Cooperatives	na	144	144
7	Producer Cooperatives	-	-	47

Source: Solomon Bekure et al. Evaluation of the Arsi Regional Development Unit, 1981 Appendix IV 6, Table 5.

na = not available

Following the operation of the project and the rapid growth of the distribution of the new inputs, and the associated peasant institutions, Arsi underwent a rapid increase in agricultural output. The estimated change in hectarage by different crops in the base period of 1966 and just prior to the agrarian reform of 1974/75 and five years after the agrarian reform in 1980 are given in the following tables.

Table 6.11 Change in Area under Crops in Arsi 1966-1980 in '000 Ha

SL NO	Crop	1966		1974/75		1979/80		Rates of Growth(%)[16]		
		Ha	%	Ha	%	Ha	%	66-74/75	75-80	66-80
1	2	3	4	5	6	7	8	9	10	11
1	Wheat	50.0	22	201.3	38	116.6	25	19.0	10.4	10.4
2	Barley	100.5	44	154.9	30	163.1	35	5.6	1.0	3.4
3	Teff	13.7	6	24.5	5	45.7	10	7.5	13.3	8.8
4	Maize	13.4	6	45.0	9	51.0	11	16.3	2.5	9.6
5	Sorghum	0.5	-	20.1	4	22.8	5	58.7	2.5	26.1
6	Subtotal	178.1	78	445.8	86	339.2	86	12.1	5.3	6.8
7	Chickpea	0.3	-	1.2	-	41.8	10	18.9	-	
8	Beans	9.5	4	32.1	6	9.6	2	16.4	-	
9	Peas	12.0	5	12.5	2	18.7	4	0.5+	8.3+	2.5+
10	Flax	25.1	11	8.2	2	1.6		-13.1	-5.0	
11	Lentils	0.4	1	11.9	2			Neg	Neg	
12	Others	0.1								
13	Total	225.1	99	522.7	99	470.9	100	11.1	-2.1	6.2
14	Non-peas	2.0		30.4		6.2	7	40.5	-27.3	21.4
15	Peasant	223.1		492.3		464.4		10.4	-1.2	5.8

All "other" rows 7-12
Includes 4,000 ha. by peasant coops

16 All growth rates are compound and computed between the beginning and end periods.

Source: For 1966: CSO, IEG A Survey of Arsi Province Addis Abeba, 1966 pp.17-19 Arsi Rural Development Unit (ARDU), Crop Sampling Survey in Arbagugu and Ticho, ARDU No.8 Assela, April 1977 p.12; PMGSE Area Production and Yield of Major for the Whole Country and by Region Vol.1 Addis Abeba July 1979 p.59; ARDU. Investigations on the Impact of Agrarian Reform on Peasants' Income and Expenditure Pattern, 1980, ARDU No.18 Assela,1981 pp25-26. ARDU A Review of Agrarian Reform and Rural Development in Ethiopia, ARDU No. 25, Negussie, W. Michael, 1984.

In the decade 1966-1975, the area under cultivation increased at an average compound rate of 11.1% for Arsi as a whole an increase of about two and half times for Chilalo, (the sub-province where the project was initiated) and 2.3 times for Arsi as a whole. In absolute terms, most of the increase was accounted for by the commercial crop wheat, which increased at almost double the average rate (Table 6.11 column 9) and mostly at the expense of grazing land (Cf table 6.13 row 4, column 7, row 6 column 7). The extent of the rapidly increasing rate of land under cultivation is attested at a less macro level agricultural survey in the middle of the pre-agrarian reform new technology decade (1966-1974/75) by CADU in 1969 and 1970.

Table 6.12 Change in size of Mean Cultivated Land in 1969 and 1970 Cropping Seasons in the CADU Project Area

SRL NO	Status of Tenure	No.	Average Cultivated Land (Ha)		$\bar{X}$ Change		Percentage Which			Balance
			1969	1970	Ha	%	+	K	−	(8-10)
1	2	3	4	5	6	7	8	9	10	11
1	Landowners	192	4.8	5.6	+0.8	16.7	48.3	28.4	23.4	+24.9
2	Tenants	140	3.5	3.8	+0.3	8.6	43.6	29.3	26.9	+16.7
3	Others	78	3.6	4.2	+0.6	16.7	48.9	39.0	15.3	+34.6
4	Total	410	4.1	4.7	0.6	14.6	47.0	30.0	23.0	+24.0

$\bar{X}$=mean, + increased, K constant and - decreased

Source: Computed from CADU. General Agricultural Survey 1971 (Baseline Study for Evaluation of Impact of the Project), CADU Publication No.71, Assela, July 1971, p.8. In this study, 438 farmers were sampled in the two areas of the project (north and south) where the project commenced earlier in 1967 (north) and later (1969) in the south. The samples were drawn from 11 extension areas (each extension area having about 2,000 farming households) which were further made up from 28 "golmassa" areas (the lowest administrative unit in the then rural institutions covering about 400 Ha of land). Part owners and part tenants on the one hand and "others" whose status was ambiguous when cultivating land belonging to relatives (fathers, grandfather etc) without "owning" land yet and/or not paying tenancy rent.

Table 6.13 The Change in Land Ownership and Use in the CADP Project Area Between 1969 & 1970 Cropping Seasons

SL No	Land Use / % in 1969		Those Increasing	Change in % in 1970		
				Those Decreasing	With No Change	Net change
1	2	3	4	5	6	7
1	Land Owned	57	3	-	54	+3
2	Land Rented in	77	25	15	63	+10
3	Land rented Out	21	10	17	33	- 7
4	Grazing Land	86	11	25	61	-17
5	Cultivated Land	100	46	25	29	+39
6	Land under Wheat	73	58	19	17	+39
7	Land under Barley	95	35	40	26	-5

Source: Same as Table 6.12

While the total extent of change in land under cultivation by holding size is not given, which could have given the varying levels of the use of land between those peasants being able to reap the benefits of the technology (middle and rich peasants) and others who could not (poor and lower middle peasants)[17], taking tenants and "others" together, there is no significant difference between owners and tenants in the percentage of peasants who increased their holdings under cultivation (Appendix 6. Table 2). The net increase in land under cultivation - mainly under wheat - affected 39% of sampled farms along with a

17. This is demonstrated in section six of this chapter.

net reduction of grazing land by 17% and of barley by 5%. Taken with the positive balance between land rented in and rented out by owners and the dramatic increase in land rented in by tenants (Appendix Table 2a), it suggests that at least at this stage of the project, most of the area expansion under crops was attained through the conversion of grazing land into arable farming and the substitution of barley by wheat rather than by a massive eviction of tenants as most studies of the project in the pre-reform period asserted (Henock: 1972; Stahl: 1973, 74). A more helpful analytical device would have been to examine this dynamic under holding size rather than only the status of tenure [18] as most CADU/ARDU studies tended to present in their findings. The project level study which covered about half of Chilalo at this time, however clearly sustains the rapid expansion of area under cultivation presented in Table 6.11. The same survey showed a significant reduction in the cattle herd - with a relatively high offtake of 9.2% per annum. [19]

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18. We show in later sections this process at provincial level for 1966, 1971, 1974/75 and 1980.

19. Its implication for output and the case for the mechanical component of the new technology is discussed in section 4.

Table 6.14 Change in the mean Size of Livestock in the CADU Project Area in 1969-1970

SRL NO	Status of Tenure	No of HH	$\bar{X}$ LU+ in 1969	$\bar{X}$ LU in 1970	Change LU 1969-1970	
					No	%
1	2	3	4	5	6	7
1	Landowners	198	16.6	14.9	-1.7	-10.2
2	Tenants	153	6.9	6.7	-0.2	-2.8
3	Others	85	10.3	9.7	-0.6	-5.8
4	Total	436	12.0	10.9	-1.1	-9.2

+LU: livestock unit: 1 ox, 1 cow, 2 young cows, 3 calves, 1 mule, 2 donkeys, 5 sheep and 5 goats.

Source: CADU, General Agricultural Survey 1971 (Baseline Study for Evaluation of Impact of the Project) CADU Publication No.71, Assela July 1971, pp.31 32. Unfortunately, the survey does not give the type of increase and decrease by type of animal to make any useful inference about change in the availability of traction animals in conjunction with the rapid rise in cultivated land and its implication for the demand of alternative traction and harvesting services.

As with most of the research (seed, agronomic, cultural practices), the new inputs and agricultural extension efforts were directed towards the high valued crop, wheat. Within the unprecedented real growth rate of 18.2% for Arsi as a whole, the commercial crop, wheat, replaced barley as the most important crop in the region.

Table 6.15 Estimated Value and Rate of Growth of Crop Output in Arsi in 1966 and 1974/75 (Mill. of Eth.Birr) at 1971 prices

Sl. NO	CROP	1971 Prices (Birr) /Qtl	1966			1974/75			Rate of growth of output in 66-74/75
			Yield Qtl/Ha	Value Mill Birr	%age share of value	Yield Qtl/ Ha	Value Mill Birr	%age share of value	
1	2	3	4	5	6	7	8	9	10
1	Wheat	22	9	9.9	27.9	15[20]	66.3	56.1	26.8
2	Barley	15	10	15.0	42.5	13	30.2	25.5	9.1
3	Teff	27	7	2.7	7.5	81	5.3	4.5	18.9
4	Maize	19	13	3.3	9.2	19	16.2	13.7	22.0
5	Sorghum	17	12	0.1	0.5	12	4.1	3.5	45.8
6	Cereals			31.1	87.5		122.1	92.8	18.6
7	Others			4.5	12.4		9.5	7.2	9.8
8	Total			35.6	99.9		131.6	100	18.2
9	Peasant sector			34.9	97.9		118.2	89.8	17.0
10	Non-Peasant sector	22*	20	0.7	2.0	20	13.4	10.2	44.6

* wheat at average yield of 20 Qtls/Ha

Source: IEG, CSO: A Survey of Arussi Province, AA 1966 pp.17-19; ARDU: Crop Sampling Survey in Arbagugu and Ticho, ARDU No.8 April 1977, p.12; PMSGE: Area Production and Yield of Major Crops for the Whole of the Country and by Region, Addis Abeba, 1980, p.59.

20. Assuming 13 qtls/Ha for the peasant sector and 20 qtls/Ha for the non-peasant sector.

A lower base for the 1966 period may have exaggerated the estimation of rate of output. However, we have used a rather conservative estimate of yield especially for the important crop wheat.[21] Making allowances for possible loss in incomes from animals with the shrinkage of grazing land,[22] and population growth rate of 4.9% (cf.section 5, Chart 6.6) net agricultural per capita income in Arsi may have increased by at least 10% per annum.

Table 6.16 Estimated Value of Crop Output in Arsi in 1974/75 and 1980 in Mill. of Eth.Birr at 1971 prices

SL NO	Crop	Value in 1974/75	Yield Qtl/ha	1979/80		Growth Rate %		
				Value mill. Birr	%share	66-75	75-80	66-80
1	2	3	4	5	6	7	8	9
1	Wheat	66.3	12.4	31.0	26.2	26.8	-14.2	8.4
2	Barley	30.2	16.0	36.8	31.1	9.1	4.0	6.6
3	Teff	5.3	11.3	13.9	11.7	18.9	21.3	12.4
4	Maize	16.2	20.0	19.3	16.3	22.0	3.6	13.4
5	Sorghum	4.1	15.1	5.8	4.9	45.0	7.2	7.9
6	Cereals	122.1		107.5	90.2	18.6	-2.6	9.3
7	Others	9.5		10.9	9.2	9.8	2.8	6.5
8	Total	131.6		118.4	99.4	18.2	-2.1	8.3
9	Peasant Sector	118.2		116.4	98.3	17.0	-0.4	7.0
10	Non-Peasant Sector	13.4		1.98	1.1	44.6	-31.8	7.7

Source: IEG, CSO: A Survey of Arsi Province,1966, ARDU No.8 op.cit.1977, p.12 PMGSE:1980 p.59; ARDU 18 op. cit. 1981 pp.25-26.

21. CADU/ARDU surveys reports of yields (all in qtls per Ha) are rather at very high variance (on the positive side) with national averages. CADU 13 p.13 1966: wheat 11.2, barley 10.2; CADU 30 p.23 1967:wheat 12.7, barley 14.0; CADU 30 p.68 1968:wheat 10.1, barley 11.8, wheat 12.9 fertilized; CADU 49 p.11 1969: wheat 20.9,barley barley 16.4; CADU 108 p.8 1973: wheat 17.9 fertilized 16.9 all farmers, barley 6.7 unfertilized.

22. Case farmers (30 used in the analysis in Chapter 5) earned 26% of their agricultural incomes from animal products. A larger sample(CADU:1973, p.30) found 10% of agricultural incomes as originating from animals.

As in the post-agrarian reform period, while the fall in output in Chilalo is considerable, (see also Chart 6.2), it has been offset by the modest levels of growth rate of output in Arbagugu/Ticho, where the technology was introduced for the first time in conjunction with the agrarian reform.[23] The overall fall in output growth in Arsi as a whole during 1975-80 accounted mainly by the hitherto cash crop, wheat, within a modest growth for all subsistence crops (cf. Table 6.16, col.8) is a fundamental problem with respect to agrarian transition in the aftermath of the agrarian reform which is discussed at length in section 6. Taking the period 1966-80 as a whole, Arsi underwent a real growth rate of 8.3% in crop output marked by sharp rises in 1966-74/75 and a fall (1975-1980) (the latter mainly accounted for by Chilalo where the technology was introduced early in 1967). The bargraphs of acreage and value of output for Chilalo, Arbagugu/Ticho and Arsi as a whole for 1966, 1974/75 and 1979/80 and the breakdown by the major crops is attached (Chart 6.2).

Within the generally high levels of growth, most of the increased output was attained equally by increase in area in a single season rainfed agriculture, rather than by spectacular increase in yield and/or the substitution of low value crops by high valued ones and/or multiple cropping.[24]

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23. Unlike the 1966-74/75 pattern in Chilalo where the size of the rich peasant stratum was considerably higher, in Arbagugu/Ticho the growth in output has been achieved by mainly lower and upper middle peasants (cf. section b, Tables 6.45 and 6.46).

24. The economic implication of these aspects is brought out in relation to development strategy choices between the so-called scale neutral biological and mechanical components of the new technology, the farm size and land productivity debate and the problem of agrarian transition in African social formations with high land labour ratio and low level of the productive forces is spelt out in chapter seven

Table 6.17 Growth Rates of the Value of Output (in 1966-1980) and the Derived Percentage Share of Growth accounted for by Yield and Acreage in 1975 and 1980

SL No	CROP	1966-1975			1975-1980			1966-1980		
		% of growth	% share of growth in		% of growth	% share of growth in		% of growth	% share of growth in	
			Yield	Acre-age		Yield	Acre age		Yield	Acre-age
1	2	3	4	5	6	7	8	9	10	11
1	Wheat	27	43	57	-14	-24	-76	8	19	81
2	Barley	9	49	51	4	75	25	7	48	52
3	Teff	19	65	35	21	37	63	12	29	71
4	Maize	22	40	60	4	30	70	13	28	72
5	Sorghum	46	13	87	7	65	35	8	-169	100
6	Cereals	19	35	65	-3	-15	-85	9	27	73
7	Others	10	61	39	3	64	36	7	61	39
8	Total	18	52	48	-2	0	-100	8	25	75
9	Peasant	17	39	61	-0.4	-140	-60	6	35	65
10	Non-Peas.	45	9	91	-3.2	-14	-86	21	-180	100

Source: Derived from rates of growth of value of output and hectarage in tables 6.15 and 6.16. The relatively very high percentage of yield for barley, the share of the most important subsistence/crop of Arsi towards which the new technology was not geared, is difficult to explain except perhaps by the 'transfer' effect of the importation of the farm management practices in wheat.

In the pre-agrarian reform period, the overall rate of growth of output was equally shared between area and yield increase[25] (and also of product mix in the aggregate) with no significant overall increase in the post-reform period (See also Chart 6.2 for variation of increases

25 In a similar period (1965/66-1977/78) in the Indian Punjab, overall agricultural output increased by 8.4%, that of wheat by 11% and rice by 20% with most of the growth accounted for by yield increase and multiple cropping made possible by the dramatic rise in the net irrigated area which rose from 50% of net sown area in 1950/51 to 85% in 1979/80. Bhalla G.S.& Chadha G.K. Green Revolution and the Small Peasant: A Study of Income Distrib. Among Punjab Cultivators, New Delhi: 1983 pp.12-14.

in the 'old' project area (Chilalo)and new ones). A comparison of the pattern of increase in the hectarage and value of the major crops[26] between Arsi and Ethiopia in 1966-1974/75 brings out the contrasting base for rates of agricultural growth and Arsi's emergence as the most important agricultural surplus generating region in Ethiopia especially for the high demand elastic crop, wheat at lower levels of income as in Ethiopia.

Table 6.18: The Percentage Share and Comparative Growth in Ethiopia and Arsi in 1966-1980

a) Acreage

SL NO	Cereals	% Share of Arsi			Growth Rate (%)					
		1966	1975	1980	1966-75		1975-80		1966-80	
					Ethiopia	Arsi	Ethiopia	Arsi	Ethiopia	Arsi
1	2	3	4	5	6	7	8	9	10	11
1	Major Crops	6.1	9.7	9.2	4.2	9.2	0.1	-1.0	2.8	4.6
2	Cereals	5.7	10.0	9.2	4.0	12.1	0.7	-1.0	2.9	6.2
3	Wheat	12.8	26.3	31.9	7.4	15.3	-7.8	-10.8	2.1	10.0
4	Barley	14.2	20.3	19.6	1.0	4.6	1.9	1.0	1.3	3.4
5	Maize	3.0	6.0	4.8	5.6	13.3	4.0	2.5	5.1	9.6
6	Millet	-	-	-						
7	Sorghum	0.5	2.7	3.4						

b) Value of Output at 1971 Prices

1	2	3	4	5	6	7	8	9	10	11
1	Cereals	5.9	16.9	14.1	3.1	18.6	0.9	-2.6	7.7	2.3
2	Wheat	14.9	45.2	33.3	10.2	26.8	-7.3	-4.2	5.7	8.4
3	Barley	18.0	36.6	39.7	-0.2	9.1	2.1	4.0	0.8	6.6
4	Maize	3.4	10.5	11.3	7.0	22.0	11.2	3.6	1.7	13.4
5	Millet	0.9	2.2	4.9	1.0	18.9	4.3	21.3	2.1	12.4
6	Sorghum	1.4	3.7	5.2	5.4	45.0	1.2	7.2	3.6	7.9

Source: PMGSE 1982, p.4,20,21,24,32; PMGSE 1983,p.22, CSO, A Survey of Arsi Province, 1966, pp.17-19

26. See next page

In the post-reform period, both in Ethiopia as a whole and in Arsi, while the overall[26] rate of increase in acreage considerably slowed down, the commercial crop, wheat, did so more than others in both. However, Arsi's importance as the leading wheat producer increased although wheat acreage and yield for Arsi also drastically decreased.[27] Charts 6.2 - 6.4 more clearly depict regional (Chilalo versus Arsi as a whole), versus national growth rates, the variations between the subsistence and commercial crops as also the distinct growth pattern in 1966-1974/75 and 1975-80, two periods marked by the first introduction of the new technology (1966) and the agrarian reform of 1975.

Between 1966 and 1980, Arsi underwent a very rapid growth in agricultural output. In 1968/69 - 1975/76, disregarding the loss in the output of animals and their products, the CADU/ARDU 'development cost' including capital investment in road, research and expatriate staff was 5.1 mill.Birr/annum against a net incremental benefit of 12 mill.Birr (Table 5). With output increasing at a compound rate of 18.6% in 1966 - 1974/75, -2.6% in 1975/80 averaging 8.3% for 1966/80, the annual development cost (including fixed) was about ½ of ncreased output even in such initial years. Cereal production was nearly 17% of the national output in 1974/75 from just under 6% in 1966. The rapid growth

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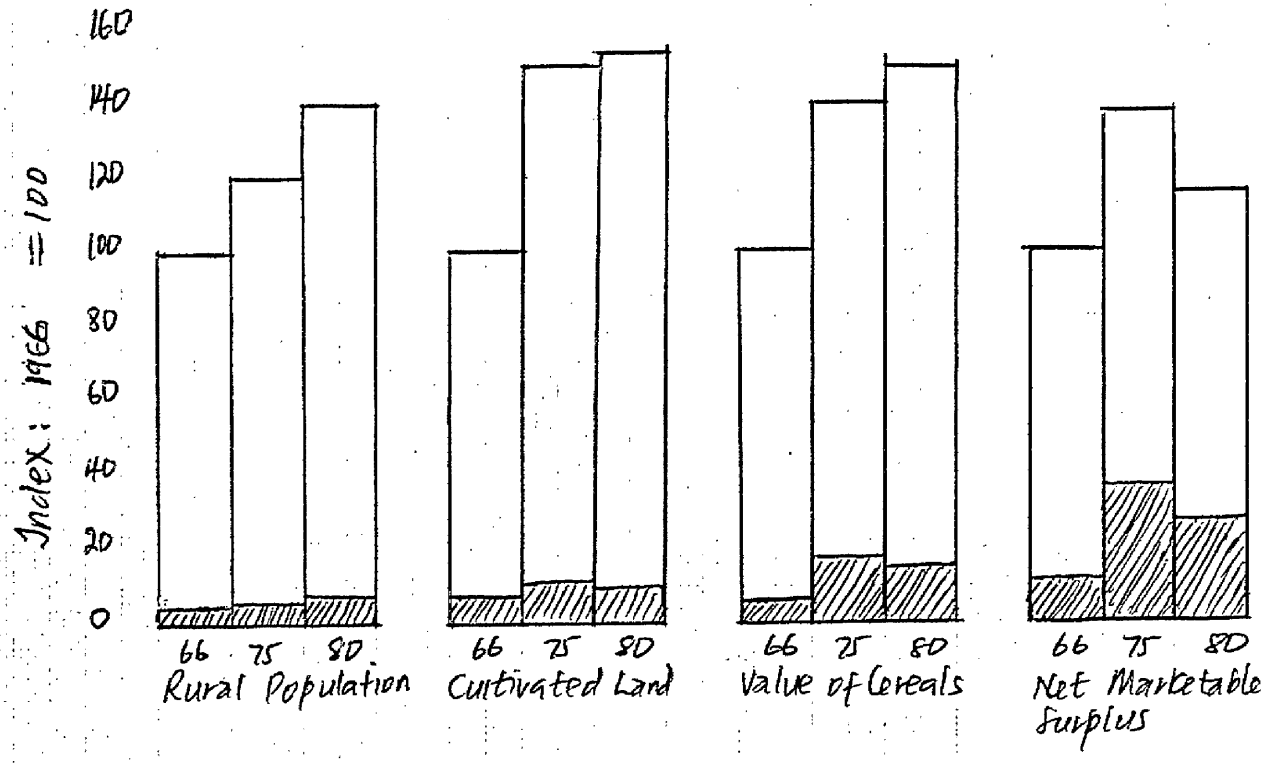
26. The 'major crops' are teff, barley, wheat, maize, millet, oats, horse beans, chick peas, haricot beans, field peas, lentils, soya beans, neug, flax, vetch, rape seed, sunflower and sesame which make up more than 90% of the area of cultivated land with the first seven major cereals making up 80% of all land cultivated; PMGSE: Area, Production & Yield of Major Crops for the Whole Country & by Region, Addis Abeba, July 198

27. This shift in acreage and its consequences for the marketed surplus is discussed in section 6.

rate in Chilalo (the first project area) appears to have been halted following the agrarian reform of 1975 mainly because of a fall in land under wheat cultivation formerly held by emerging proto capitalist farmers and rich peasants and to some extent perhaps because of a fall in land productivity as we shall see in the next section. However, with a steady rise in the subsistence crops especially in Arbagugu/Ticho where the technology was introduced in the post-reform period, the overall fall in output is not substantial. In 1980, Arsi's share of the national wheat output was one-third with nearly 5 times the cereal per capita for the country as a whole. Most of the increase in output was from increased land under cultivation. The dynamics set in motion by the technology in the increased land and labour productivity leading to the increasing demand for land and subsequent rise in its price, levels of share cropping, the eviction of tenants ushered in new relations of production in Arsi agriculture with the emergence for the first time of capitalist ground rent (contract land rent) and an increasing differentiation of the peasantry. Before analyzing the specificity of this process, we examine its economic basis in the changing productivity of land and labour with the new technology, its implications for factor proportions with distribution and accumulation goals using data from case farms in Chilalo.

Chart 6·3: Ethiopia: Index (1966=100) of Change in Population, Cultivated Acreage, Value of Cereals (at 1971 prices) and the Net Marketable Surplus Compared With Arsi



SI NO	Variables	Year 1966	1975	1980
1	Population %	3·5	3·7	3·8
2	Acreage %	6·0	9·7	9·1
3	Net Mark. Surp. %	10·2	36·8	32·0
4	Acreage ÷ Popn	1·7	2·6	2·4
5	Value of Cereal ÷ Pop.	1·7	4·9	4·1
6	Mkt Surplus ÷ Popul	2·9	9·9	8·4
7	Value of Output	6·0	18·3	15·6

Source: Table 6·18

4.4. FACTOR PROPORTION AND PRODUCTIVITY IN CHILALO PEASANT FARMS.

In the discussion of agrarian transitions in relation to the current use of factors, factor proportions and their productivity especially in the context of the evaluation of the new technology, redistributive agrarian reform and the production and dissemination of profitable farm technology hedged against risk are said to meet the efficiency, distribution, growth and the intersectoral linkage objective of development (Griffin: 1974; 1979; Lipton:1974; Cline:1970; Cline and Berry:1979). The formulations draw from the factor proportions in most parts of Asia and Latin America on the one hand and the observed inverse relation between farm size and productivity on the other.[28] A combination of land augmenting 'scale neutral' biochemical components of the new technology with irrigation and multiple cropping, a change of factor proportions towards higher labour land ratio are said to increase output, save foreign exchange (otherwise used for mechanical power) and expand the home market. In Latin America, by significantly increasing the land fund available to small farmers and its productivity, the new agrarian structure without extensive investment

28. A recent survey of the literature in India and an empirical analysis of the data from Punjab disaggregated by regions suggests that in an early stage of the new technology, due to intrinsic advantages mainly institutional in the acquisition and the use of the new technology, the inverse relation disappears while at a later stage the scale advantage of bigger farmers operate to change any inverse relation to positive. Pramit Roy. "Transition in Agriculture : Empirical Indicators and Results: Evidence from Punjab India" in Journal of Peasant Studies, Vol.8.No.2 Jan.1981 pp.212-242. For the consistency of the inverse relation see Cline, W.R.and Albert Berry: Agrarian Structure and Productivity in Developing Countries, 1979.

in irrigation could meet similar policy objectives (Cline. 1970; 1979; Barraclough: 1966).

The earlier farm productivity debate based on farm management data in India prior to the advent of the new technology (Sen: 1962, 1964; Krishna : 1962; Mazumdar: 1963; Rao: 1963; Bardhan: 1964) defined the problem and clarified methodological issues.[29] Some analysts criticized the formulation of the farm productivity problem in terms of what we may call 'land based' elements to the exclusion of efficiency in the use of the other resources and the possibility of factor substitution (Krishina:1962) - a case which confuses the micro aspect (where there might be possibilities of substitution between the 'traditional' and the new mechanical capital) and the macro constraints in the relative supply of land, labour and capital in the agrarian economy of the poor countries. While the empirical findings were by no means unanimous, they indicated regional variations with inverse relation holding less in more advanced districts and in the context of the new technology, a change from constant to positive relation between output per acre and farm size. Other critiques (Rudra:1968, 1969,1970, 1976; Patnaik:1976; Chowdhury:1970; Roy:1981) point to the initial ownership/ accesibility of factors, the varying relative factor and product prices and the subsequent production functions faced by different classes of farmers. These set the

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29. They reported tested the inverse relation and its causation- in terms of capital/land, capital/labour and land/labour ratios independently, with their complementarity and non-resource factors, such as the quality of soil and the farm management practices of different class of farmers.

range of possibilities in the choice of factors, their proportion in use and the resulting factor productivity and distribution of the product. In explaining the inverse relation and the proportions employed by small farmers in Indian agriculture, Rudra distinguishes the social and economic variables which force small farmers (poor peasants) to intensify their input of labour per unit of land (the need for survival and obligation to the state and/or their overlord) and others which permit them to do so (the low opportunity cost of labour, the indivisibility of capital, superior quality of land, better management. Rudra:1968).

However, when using gross cropped area to take into account double and triple cropping, he disputed the inverse relation even in small farms. Notwithstanding the political feasibility/possiblity of such redistribution, given the distribution of power in the agrarian societies and the social formation at large, the policy measures hinge on the implicit and explicit assumption of the existence of 'surplus labour',[30] the substitutibility of capital by labour especially at the farm level (within the traditional technology) and between the new and the old technology, and land as a critical constraint for increased output and equity. The inverse relation debate and the policy implications derived for agrarian transition are based on agrarian structures in Asia and Latin America,

30. The literature on surplus labour, the distinction between surplus labour and hours, the level of the marginal product of labour in peasant agriculture, the conditions for being 'surplus', their implications for restructuring the agrarian sector, income distribution, supply of labour to non-agriculture, is extensive which formed the basis of the discussion on development in the immediate post-war period.

the similarities and differences of which with African agrarian social formations were discussed in chapters two and three.

We set out the farm size, land productivity (hectares of cultivated land in all cases) and the related hypothesis and alternative ones as:

a) Labour input per hectare is inversely related to the size of net sown area (c)/ there is no significant relation between them.

b) Output per hectare is inversely related to the sizeof net sown area / there is no significant relation.

c) Output per hectare is directly related to labour input per hectare independent of capital - total, per hectare and by type - old and new capital inputs.

Maintaining the four way classification of peasant farms (before and after the new technology - villages 1 and 2 / villages 3 and 4 respectively and holdings of less than 4 hectares for poor and lower middle peasants on the one hand and greater than 4 hectares for upper middle and rich peasants on the other as in chapter four), we built simple regression (hypothesis a-b) and Cobb Douglas (hypothesis c) production function model.

All measurements in Ethiopian Birr at 1971 prices.

The Income Productivity Model

A. Farm Size and Labour Input per Hectare.

B. Productivity of Land and Farm Size.

B.1 Gross Output

B.2 Gross Cash Output

B.3 Net Output: Total Cost (purchased and imputed); less B.1

C. Productivity of Land and Factor Inputs per Ha

C.1 Land Productivity and Labour Input per Ha

C.2 Land Productivity and Oxen Services per Ha

C.3 Land Productivity and Purchased Inputs per Ha

D. Productivity of Land separately controlled for Labour and Capital per Hectare - the Two Factor Cobb Douglas Production Function Model

D.1 Per Hectare Factor Inputs and Land Productivity (Gross and Return to Family Resources - Gross Incomes less Purchased Inputs)

D.2 Total Factor Inputs and their Productivity.

A. Table 6.19 Farm Size (Xi) and Labour Input per Hectare (Yi) in Birr

SL No	Production Unit	X_b	Xi	R2
1	2	3	4	5
		(9.2)	(4.7)	
1	Vill. 1&2	133	-12*	42
		(98.3)	(6.1)	
2	Vill. 3&4	57	-5.5	04
		(32)	(34)	
3	< 4 Ha	89	3.5	08
4		(54)	(9)	
4	> 4 Ha	16	10.3	09
		(19)	(4.1)	
5	All Farms	19	-38.5*	72

( ) Si * Highly Significant

Labour input is significantly related to output per hectare in the pre-technology studied villages and for all the farms aggregated together. In both cases, the relationship is negative i.e. as the cultivated land size increases, the input of labour per ha. decreases. The inverse relation between farm size and labour is also observed in land productivity and farm size for villages 1 and 2 (pre-technology) and holdings of less than 4 hectares (Table 20).

Table 6.20 Net Sown Area in Hectares (Xi) and Output per Hectare (Gross Output = B.1, Gross Cash Income = B.2 and Net Output = B.3 = Yi Respectively)

SL No.	Category	B1			B2			B3		
		Xo	Xi	R2	Xo	Xi	R2	Xo	Xi	R2
1	2	3	4	5	6	7	8	9	10	11
1	Vill.1 & 2	172.9	-20.6(4.6)*	84	226.0	-46.9(2.5)	68	84.2	-1.32(05)	31
2	Vill.3 & 4	172.6	+12.1(1.88)	52	21.3	+11.9(5.5)*	67	152.4	+4.77(.45)	19
3	<4 Ha	213.4	-16.9(0.35)	60	189.8	-45.0(2.1)	43	130.2	+0.74(.001)	40
4	>4 Ha	90.5	+20.7(3.2)	58	14.7	+12.0(2.7)	79	84.0	+12.3(1.97)	20
5	All	126.9	+14.7(3.4)	54	57.6	+4.53(o.4)	34	104.2	+9.3(2.3)	20

() = F Values * SIGNIFICANT

In all cases, the proxies for agricultural income per hectare (gross incomes, gross cash incomes and net incomes) increase with the size of the net sown area (and significant in most cases) in the new technology using villages (villages 3 and 4) and holdings of larger than 4 hectares. On the other hand, there is evidence of an inverse relationship between holding size and land productivity in the smaller holdings and in villages 1 and 2 and significant in the former (except in holdings of less than 4 hectares with net incomes). It is also interesting to note that within the new technology users, the per hectare increase is higher in the larger holdings than in villages 3 and 4 which while using new technology, have within them smaller holdings as well. Both in villages 3 and 4 and holdings of greater than 4 hectares, the coefficient with gross cash incomes (mainly the sale of wheat) are positive and significant.

In order to identify the "sources" of land productivity, single regressions were constructed with inputs per hectare which a priori were thought to be important variables in the variations of output per hectare.

The labour input farm size relationship in Table 6.19 is translated into land productivity and farm size relationship in the pre-technology villages. In the post-technology villages, while the labour input/output per hectare coefficient was positive, it is neither significant nor the regression explained the variations

in the two variables adequately. In the later cases, the positive and insignificant relationship between land productivity and size of cultivated land led us to measure the relationship between land productivity on the one hand and the factors of production with the non-labour ones disaggregated into the new and old technology inputs as in the following tables.

C. Productivity of Land (Yi) and Factor Inputs (Xi)

C.1 Output per Hectare of Net Sown Area (C.1.a = gross, C.1.b = cash, Incomes = Yi from Crops and Labour Input per Hectare (Xi).

C.1

Table 6.21 Output per Ha. of Net Sown Area
(C.1.a = Gross; C.1.b = Cash; C.1.c = Net Incomes)
From Crops and Labour Input per ha. (Xi)

SL No.	Category	C.1.a			C.1.b			C.1.c		
		X0	X1	R2	X0	X1	R2	X0	X1	R2
1	2	3	4	5	6	7	8	9	10	11
1	Vill.1 & 2	40.6	+1.12(07)*	37	-92.3	+2.30(.11)*	15	74.9	+.08(.79)	65
2	Vill.3 & 4	209.7	+0.40(.73)	00	48.2	+.64(.41)	04	187.3	-.32(.77)	11
3	< 4 Ha	181.1	-0.24(.82)	-07	-62.0	+2.48(03)**	13	178.4	-.88(.31)	13
4	> 4 Ha	195.8	+0.24(.87)	00	87.2	+0.08(.93)	16	174.8	-.40(17)	07
5	All	199.6	-0.16(.8)	-03	5.4	+1.44(05)*	-01	182.0	-.80(.23)	14

() = Levels of significance ** SIGNIFICANT * HIGHLY SIGNIFICANT

Independently of the other inputs, while there is a positive linear relationship between labour input per hectare and gross output per hectare (C.1.a) (except in holdings of less than 4 hectares), it is significant only in villages 1 and 2. The low level of R^2 and the level of significance in others renders the results unreliable. There is, however, a positive and more significant relationship between oxen power input and land productivity as shown in the following table.

Table 6.22 C.2 Output per Hectare of Net Sown Area from Crops=(Yi) and Oxen Power Input/Hectare (Xi)

(C.2.a = gross, C.2.b = cash, Incomes = Yi)

SL No	Prod. Units	C.2.a			C.2.b		
		Xo	Xi	R^2	Xo	Xi	R^2
1	2	3	4	5	6	7	8
1	Vill 1&2	63.10	0.40 (.28)	14	-175.5	.71** (.01)	51
2	Vill 3&4	116.1	-0.43 (.45)	06	421.8	-.18 (.69)	05
3	<4 Ha	139.5	0.32 (.28)	02	8.70	.68** (.02)	47
4	>4 Ha	205.2	0.009 (.97)	-06	-990.8	-.16 (.80)	07
5	ALL	163.9	0.26 (.35)	03	317.1	29 (.02)	-03

( ) Levels of significance

** HIGHLY SIGNIFICANT

Table 6.23 C3 Output per Hectare of Net Sown Area (Yi) [C.3.a gross incomes; C.2.b gross cash income & and Purchased Inputs per Hectare (Xi)

SL NO	Category	C.3.a			C.3.b		
		Xo	Xi	R2	Xo	Xi	R2
1	2	3	4	5	6	7	8
1	Vill 1&2	83.6	0.86** (.00)	79	61.6	0.52 (.59)	04
2	Vill 3&4	162.6	1.21** (.00)	42	30.5	0.85** (.00)	52
3	<4 Ha	125.8	1.17** (.02)	35	59.9	0.28 (.67)	01
4	>4 Ha	133.8	0.37 (.33)	07	133.8	1.37** (.00)	51
5	All	128.6	1.3** (.00)	45	44.0	0.71** (.02)	18

( ) Level of significance **Highly Significant

More than oxen, the linear relationship between purchased inputs and output per hectare are significant with reasonable levels of R2.

Table 6.24 D. Land Productivity Per Ha. ($\bar{Y}_i$) and Capital ($\bar{X}_{i1}$) and Labour ($\bar{X}_{i2}$) Inputs Per Hectare

SL	Prod. Unit	$\bar{Y}$	$\bar{X1}$	$\bar{X2}$	APX1	APX2	bo	b1	b2	MPX1	MPX2	$\bar{E}bi$	R2
1	2	3	4	5	6	7	8	9	10	11	12	13	14
								(0.70)(0.41)	(0.43)				
1	Vill. 1&2	107	47	59	2.28	1.81	1.06	.46	.15	0.83	.27	61	52
								(0.15)(0.16)*	(0.15)				
2	Vill. 3&4	229	65	43	3.52	5.32	1.64	.38	.07	2.02	1.37	45	31
								(0.46)(0.25)	(0.35)				
3	<4 Ha	168	50	52	3.36	3.23	1.37	.45	.09	1.51	.29	54	45
								(0.57)(0.22)*	(0.20)				
4	>4 Ha	208	68	44	3.06	4.23	1.31	.42	0.18	1.28	.85	60	25
								(0.17)(0.06)	(0.28)				
5	All	188	59	48	3.19	3.92	1.55	.48*	0.08	0.31	0.31	56	31

* Significant at 5% Level, ( ) si

Despite the below satisfactory levels of R2, at the mean level of output and input per hectare, the higher decreasing rate of return in holdings of less than four hectares compared to holdings of greater than 4 hectares further confirms the inverse relation between farm size and land productivity set out in the earlier tables. On the other hand, the overall increasing land productivity due to the new technology is attested by the higher marginal productivity of capital per hectare of land in villages 3 and 4 (all of which used the new technology) in contrast to villages 1 and 2 (none of which used the new technology). Holdings of less than and greater than 4 hectares fall in the intermediate range as they contain one third of the total farms from villages 1 and 2. Except in villages 1 and 2, the marginal product of capital at its mean level of input is higher than its price. The marginal product of labour is less than the going wage rate in all cases. However, even in villages 1 and 2 prior to the new technology, the marginal product of labour per hectare at the mean level of labour input is more than ¼ of the wage rate perhaps suggesting the 'land surplus' agrarian structure with alternative labour input [illegible] in extensive cattle grazing in the pre-technology period.

While the above table sets out the per hectare productivity of factors in relation to output per hectare, we also computed <u>overall</u> output and factor productivity as in the following Table.

Table 6.25 Output (Yi) and Factor Productivity - Capital (Xi1) and Labour (Xi2)

SL No.	Prod. Unit	$\bar{Y}$	$\bar{X1}$	$\bar{X2}$	APX1	APX2	B0	B1	B2	MPX1	MPX2	Σb_i	R2
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Vill.1 & 2)	305	134	159	2.28	1.92	(0.8) 1.24	(0.28) 0.58	0	1.32	0	0.58	67
2	Vill.3 & 4	970	308	195	3.15	4.97	(0.25) 0.83	(0.08) 0.41*	(0.09) 0.50*	1.29	2.48	0.91	82
3	$<$4 Ha	433	123	128	3.52	3.38	(0.51) 1.45	(0.26) 0.33	(0.47) 0.15	1.16	0.51	0.48	47
4	$>$4 Ha	1,070	382	242	2.80	4.42	(0.75) 0.05	(0.22) 0.39	(0.37) 0.86*	1.09	3.8	1.25	47
5	All Farms	741	248	183	2.98	4.05	(0.26) 0.60	(0.09) 0.56	(0.16) 0.95	1.67	3.85	1.51	82

* Significant at 5% Level ( ) Ai

Taking the overall productivity of factors (capital and labour) rather than land, the new technology villages and holdings of greater than 4 hectares (67% of which are new technology users) show a clear return to scale compared to the pre-technology villages and holdings of less than 4 hectares. The marginal products of labour are more than twice the wage rate with the new technology and about half the wage rate in holdings of less than 4 hectares (67%) of which did not use the new technology). This is partly because of the rise in the price of land, and wages with access to the new technology by rich peasants and mechanized farmers especially during the harvesting

At the mean level of input, the marginal products of capital is at nearly its opportunity cost with the new technology. In the pre-technology Villages, on the other hand, the higher marginal product of capital compared to the new technology using peasants may be due to the non-substitutability of capital (the scarce factor in the form of oxen services) by labour. The widespread adoption of the new technology is evidenced from its almost triple average product of labour.

The simple analytical model developed clearly demonstrated that there was indeed a negative relation between labour input per hectare of net sown area and net sown area in the pre-technology villages, while there was inverse relation between land productivity and net sown area in the pre-technology villages and holdings of less than 4 hectares, it breaks down and becomes positive with statistically significant results in some cases in the new technology using villages with changes in factors, factor proportions and productivity; change in the production function. Moreover, the inverse relation between land productivity with net sown area in villages 1 and 2 and smaller holdings which changes to positive in the new technology villages and holdings of over 4 hectares does so with respect to gross and net (Table 6.20) incomes. The latter implies that the observed phenomenon is not at least only because of the higher imputed cost of family labour in the pre-new technology villages but higher productivity in the post-technology villages and also of perhaps management efficiency or other variables not captured in the model.[31] The latter might include the relatively fertile and mostly virgin soils especially in the early years of the project when the farm management studies were undertaken, the improved farm management practices imparted to the upper middle and rich peasants who were the main beneficiaries

31. Such as the accounting size, crop mix could be other factors but being in the same ecological zone and the consideration of net output might dispel such influences. in the cause for the inverse relation.

of the project's activities as we shall see in the next section. In the pre-technology villages (1 and 2) and holdings of less than 4 hectares (33% of which are in these villages), oxen and to a much lesser extent labour explained most of the variations in output.

The high land and labour productivity of the new technology inputs accompanied by increased net sown area (table 6.4) in villages 3 and 4, clearly show the contrasts in the pre and post new technology period in the surveyed villages on the one hand and for Chilalo and Arsi between peasants able to buy and use the inputs and others who could not.[32] Of particular significance is that not only the hectarage more than doubled in 1966-1974/75, with change in crop mix to the high valued wheat, although not statistically significant in all cases, output per hectare may have increased with increasing size at least in some areas.[33] We did not have similar farm level data for mechanized farmers. In the following table, we show a simplified comparative cost/return analysis of the new technology inputs in the two villages, and mechanized farmers on the one hand and the pre-technology period study (villages 1 and 2) on the other to extend the resource use analysis and to show the basis of the changing agrarian structure in Arsi leading to the social differentiation of the peasantry and the emergence of rich peasants and proto capitalist farmers using mechanized agricultural operations.

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32. In section 6 we estimate the levels of income by holding size.

33. Its policy implications in the post agrarian reform period output and the marketed surplus in the context of land 'surplus' - social formations in Africa in contra-distinction to the labour surplus ones in Asia is discussed in section 6.

Table 6.26 Per Hectare Comparative Cost, Return and Factor Proportions in Chilalo Peasant Case Farms and Mechanized Farms (in Ethiopian Birr) at 1971 prices*

SL No	Item	Vill 1&2	Vill 3&4	4 Ha	4 Ha	All Mech.	
1	2	3	4	5	6	7	8
1.0	Total Revenue	142	301	170	382	259	455
2.0	Total Cost I (2.1+2.2+2.3+2.4)	235	387	255	392	392	239
	Total Cost II (2.1+2.2+2.4)	169	191	189	196	182	227
	2.1 Oxen/machine power	109	83	89	93	92	91
	2.2 Working capital	3	55	36	54	37	80
	2.3 land rent	66	196	61	196	153	50
			121	66	121		22
	2.4 labour cost	57	53	62	48	54	18
	2.5 Fly. Resources (2.1+2.4)	166	136	151	141	146	109
3.0	Returns to family Res.						
	3.1 Owners (1-2.2)	139	246	134	328	222	175
	3.2 Tenants (1-(2.1+2.2+2.4)	73	50	68	132		
			125		207	69	
4.0	Profit to farm Business						
	4.1 Owners (1-(2.1+2.2+2.4)	-27	110	-19	186	76	228
	4.2 Tenants	-93	-86	-85	-10	-77	206
	(1-(2.1+2.2+2.3+2.4)		-11		65		178
5.0	Rate of Return to Farm Res.						
	5.1 Owners $\frac{3.1}{2.5}100$	83	181	89	232	152	N.A.
	5.2 Tenants $\frac{3.2}{2.5}100$	44	37	45	94	47	N.A.
6.0	Rate of Return to Farm Business						
	6.1 Owners $\frac{4.1}{TCII}100$	-16	57	-10	95	42	103
	6.2 Tenants $\frac{4.2}{TCI}100$	-39	-22	-33	-2	-19	95
			-3		33		98
7.0	Capital Labour Ratio						
	7.1 Total(2.1+2.2/2.4)	i.96	2.6	2.0	3.1	2.4	9.5
	7.2 Fixed Capital(2.1/2.4)	1.91	1.6	1.4	1.9	1.7	5.0
8.0	Capital Output Ratio						
	8.1 Total(2.1+2.2/1)	0.8	0.5	0.7	0.4	0.5	0.4
	8.2 Fixed (2.1)/1	0.8	0.3	0.5	0.2	0.3	0.2

* Including Incomes from Animal Products

Assuming that the peasant households used factors efficiently, it is interesting to note the almost double cost of traction compared to labour and share cropping rent in all villages, but especially in villages 1 and 2.[34] At least on a hectare basis, a land owning peasantry's return to family resources (i.e. income less purchased inputs which is insignificant, row 5, col.4) almost totally exhausts the gross incomes.[35] In villages 3 and 4 on the other hand, there is a net return of 80% (row 10) to fixed and working capital (after deduction for payment of all inputs but including interest on capital). Introducing tenancy, in villages 3 and 4, if the tenant purchased all the inputs with a 50% share cropping tenancy (which is effectively 55% since 10% of the gross produce less cost of inputs deducted as 'tithe'), the outcome is similar to villages 1 and 2 (pre-technology) (col.15). If on the other hand working capital (new technology inputs) is deducted from gross incomes, the tenant peasant earned a return of 125 Birr to his labour after all factors are paid (row 17, col.4). In villages 1 and 2, most of the tenancy rents are paid out from the return to the traditional inputs (labour and oxen). With agricultural mechanization, where oxen power and family labour are substituted by tractor/combine harvester and wage

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34. Assuming they use the factors efficiently, this implies the supply of oxen-power rather than labour as a more critical resource for output. See regression tables 6.2 and 6.2a for oxen and purchased inputs acounting for land productivity and labour

35. It might be argued that in such cases, the peasant may as well hire out himself. However, with the possibility of bringing more land under cultivation, added incomes from animal production and increased security in the face of a limited demand in the urban economy, he may opt to stay on.

labour respectively, the return to working capital is similar to peasant farming with the new technology inputs by rich peasants (row 9, col.10 and 13). The rate of return to working capital (i.e. exclusive of the cost of family labour) is similar on rich peasant farms (holdings of greater than 4 hectares) and land renting mechanized farms owning land. However, due to the decreasing rate of ground rent to scale (cf.row 12, col.13) under mechanization[36] and the scale of operation, the return to capital/management for mechanized farmers is much higher than for the new technology using peasant farms.

It has been argued in the literature that employing the 'scale neutral' components of the new technology, its output increasing effect could complement employment (with new employees and/or increasing the level of employment of those already on farms). Taking the expost level of land under cultivation and the labour/oxen use per hectare in two studies within Chilalo (Henock: 1972; Gills: 1978) and the adjacent Ada teff/wheat area (Ellis: 1972), we computed the balance in total and incremental demand and supply of aggregate labour at the onset of the technology in 1966 and nine years later in 1975.

In order to assess the policy implications for restructuring factor ratios in the context of agrarian reform first we present a comparative empirical use of labour and traction power per hectare.

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36. This is partly because of the powerlessness of the tenanted peasantry on the one hand and, on the other, the changing agricultural system with previously adjacent grazing lands coming under mechanization being rented in larger quantity thus with lower rent compared to cultivated land under share cropping but higher than its alternative use, grazing.

Table 6.27 Per Hectare Cost of Agricultural Operations in Chilalo and Ada (in Ethiopian Birr) in Ox/Labour and tractor/combine/labour technology.

SL No	Operation	Ploughing			Weeding	Harvesting			Total		
		MD	Traction	Total		MD	Traction	Total	MD	Traction	Total
1	2	3	4	5	6	7	8	9	10	11	12
1	OX/Labour ($\bar{X}$)[37]	24	44	68	30	22	27	19	76	72	148
2	Henock	20	40	60	18	16	20	36	54	62	116
3	Gills	27	52	79	40	36	41	77	103	93	196
4	Ellis	24	40	66	32	15	20	35	71	60	131
5	Tractor/Comb/ Lab. ($\bar{X}$)[38]	-	67	67	30	-	32	32	-	130	130
6	Henock	-	57	57	18	-	35	35	-	110	110
7	Gills	-	75	75	40	-	32	32	-	147	147
8	Ellis	-	70	70	32	-	30	30	-	132	132

MD= Mondays=1 Birr, Comb=Combine Harvester

Source: Compiled from Henock. Investigations on Mechanized Farming and its Effect on Peasant Agriculture, CADU Publications No.74, Appendix 1 and 2, Assela, March 1972. Ellis G. Man or Machine: Beast or Burden: A Case Study of the Economics of Agricultural Mechanization in Ada District Ph.D. Thesis, University of Tennessee, 1972 p.33 and Gills G. Seasonal Employment and Technological Change on Small Holdings in Chilalo, Ethiopia. Ph.D.Thesis, University of Glasgow, 1978. p.97

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37. All man-days and oxen days costed at 1 Birr (the writer's observation and range of 0.25 - 1.00 for oxen in Gill: 1978 p.385.

38. Assuming the cost of manpower operating machines and their operating cost included in their rental services with 1000/yr of tractor service at a cost of 11-14 Birr/Hr in 125 working days (Ellis: 1972 p.90), hiring tractor at 24.5/Ha or 12 Birr/Hr, 2.47/qtl for combine harvester (Gills: 1978: p.257).

6.28 Aggregate per Hectare Comparative Cost of non-Mechanized (Tractor/Combine Harvester/Labour) Operations and the Percentage Share of Labour 1971 & 1975.

SL No	Study	Total		Percentage Share of Labour	
		OX/Lab	Mech	OX/Lab	Mech.
1	2	3	4	5	6
1	Henock	116	110	46	16
2	Gills	196	147	52	27
3	Ellis	131	132	54	24
4	$\bar{X}$	148	130	51	22

Source: Derived from Table 6.32

Table 6.29 Comparative Cost and Timeliness of Ox/Lab. and Mechanized Agriculture in Chilalo in 1975 in Ethiopian Birr per Hectare

	Plough ing	Harv.	Total	Cost Ratio	MD	Time Ratio	Min.[39] Scale (Ha)	Ratio		
								Scale	K/L	K/Q
OX/Labour	68	49	117	100	44	100	10	100	.9	.2
Mechanized	67	32	99	85	4	10	200	2000	4.1	.3

MD = Mandays

In the then prevailing agrarian economy of Chilalo, assuming the biochemical working capital inputs were 'scale neutral', the financial cost of OX/Labour power and mechanical power on a per hectare basis were similar.[42]

39 Assuming 3 ha per ox under natural given feed and 3 ha of cultivated land based on Gill: 1978 p.386 and 1000 tractor hours/year (125 days, 8 hours/day) with 5 hours for each hectare including travel to and from farm (Ellis:1972, p.90).

40. The cost of mean oxdays divided by mean mandays in ploughing, weeding and harvesting and the mean cost of mechanization in ploughing and harvesting by the cost of manual weeding in table 32 assuming the biological and chemical inputs that might be used were 'scale neutral'.

41. The mean oxdays per ha divided by the value of output of villages 3 & 4(using the new technology) and of the cost of mechanization by the per ha output of mechanized farms (table 6.20.

42 See next page

In the transition to mechanical power, a tractor and combine harvester would have released about 120 hectares of grazing land used for the maintenance of oxen and displaced 40 mean days of family labour used in conjunction with 20 oxendays in ploughing. A combine harvester displaced 150 man-days of labour in harvesting/threshing and 50 oxendays (pair) for the same task. For their most efficient operation measured by the tractor hours in service/year, they would have required a minimum of 20 times the land used by middle peasants practising mixed farming. Save for the type of capital used by the two systems, taking their cost of service, the capital output ratios are similar in both. The new system substituted 'new capital' by the 'old' at similar cost levels to the users. Including similar levels of labour use in weeding, the new biochemical/mechanical technology however, used labour less than one-fifth[43] of the ox/labour traditional technology with or without the 'scale-neutral' components of the new technology.

In the single cropping patterns of Chilalo/Arsi, the premium for timeliness in general may not have been as high as in multiple and triple cropping agricultural systems as in rural Asia with irrigation as the 'leading' input. Yet, even in the pre-technology period, there was proportionately a more negative imbalance in the aggregate supply and demand of labour for harvesting which was accentuated in the post-technology period.

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42. We were not able to cost the duty free element of tractors/combine harvestors. Tractor use was however found to be inelastic with respect to fuel subsidy (Tecle: 1975, p.173.)

43. The ones introduced in Arsi were 45 H.P. tractors and combine harvesters able to replace 200 mandays in mowing and threshing wheat (Ellis: 1972, p.82).

Table 6.30 Total and Incremental Balance in the Supply and Demand of Labour by Type of Task in Chilalo in 1966 and 1975 (millions of man-days)

a) Total in 1966

SL NO	Demand and Supply	Ploughing	Weeding	Harvesting	Total
1	2	3	4	5	6
1	Demand	4.6	6.9	6.8	18.3
2	Supply	9.9	17.2	5.2	32.3
3	Balance	+5.3	+10.3	-1.6	+14.0
4	3 as % of 1	115	149	-24	77.0

b) Total in 1974/75

1	2	3	4	5	6
1	Demand	11.8	18.0	17.2	47.0
2	Supply	16.2	24.2	8.1	48.6
3	Balance	4.4	6.2	-9.1	1.6
4	3 as % of 1	+37.3	34.4	-52.9	3.4

c) Incremental Balance between 1966 and 1975 at the same Level of Labour Input per hectare

SL No		Plough ing	Weed ing	Harvest ing	Total
1	2	3	4	5	6
1	Demand Balance	7.2	11.1	10.4	28.7
2	Supply Balance	6.3	7.0	2.9	14.7
3	Balance (2-1)	-0.9	-4.1	-7.5	-14.0
4	Total Balance as % of demand balance	-13.0	-37	-72.0	-49.0

d) Incremental Balance between 1966 and 1975 assuming 10% and 30% Increase in Ploughing and Threshing Tasks Respectively

1	2	3	4	5	6
1	Demand Balance	7.9	11.1	13.5	32.5
2	Supply Balance	6.3		2.9	14.7
3	Balance (2-1)	-1.6	-4.1	-10.6	-17.8
4	Total Balance as % of demand balance	-20	-37	-79	-55

Source: Computed from Gills: 1978, pp.96-98 on the sample participation rate in agricultural field work and the mean size of household by sex and age (Appendix 6.9); the population of Chilalo by age and sex in 1966 and 1975 (PMGSE:1975, p 12 and CSO: IEG 1975. Part 1, p.12), and assuming female and children labour 0.75, and 0.5 of adult men. For the supply and distribution of labour, the demand is computed assuming 123 man-days (GILL:1978 p.97) with 31 in ploughing, 47 in weeding and 45 in harvesting against the area under crops in the two periods. Supply has been seasonally adjusted to reflect the timeliness of operations. Of the aggregate supply, one-third of the annual supply (work schedule 4 months) for ploughing, ½ for weeding (work schedule 6 months) and one-sixth (work schedule 2 months) for harvesting were allocated with the seasonally adjusted equalling the aggregate (4+2+6=12 months). By dealing with the balance rather than the actual supply and demand, we have deliberately avoided the issues of 'surplus labour' in peasant agriculture. Based on a micro study, Kiros shows the existence of such labour on the basis of the fact that annually only one-third of the peasant's labour time is used in field agricultural tasks. See Fasil, Kiros. "An Estimate of the Proportion of the Potential Work Year allocated to socio-cultural Observances in Rural Ethiopia." EJDR II 2(Oct. 1978) pp.15-28.

Assuming the same levels of labour input and efficiency in the two periods, the total percentage of the balance between demand and supply drastically decreased for all agricultural tasks. For harvesting, total supply in all periods is outstripped by demand even disregarding inter-household, inter village and regional supply immobility which may accentuate the shortage in villages where the impact of the technology is the highest. The incremental balance is negative for all operations reflecting the rapid increase in the area under cultivation compared to labour and the more so when considering per unit incremental demand of labour, ploughing and harvesting. We present below a comparison of the increases in factors and prices in Chilalo between 1966 and 1975.

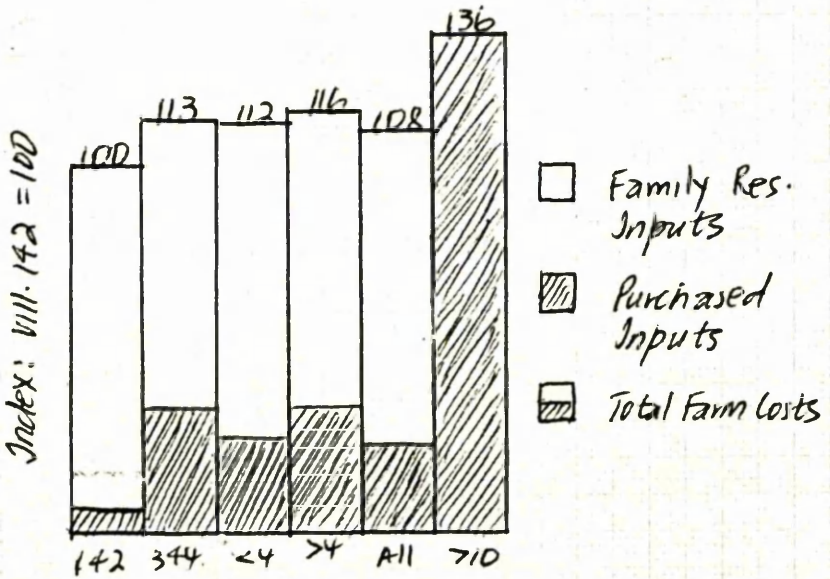
Table 6.31 The Change in the Level of Factors Use and their Prices in Chilalo in 1966 and 1975

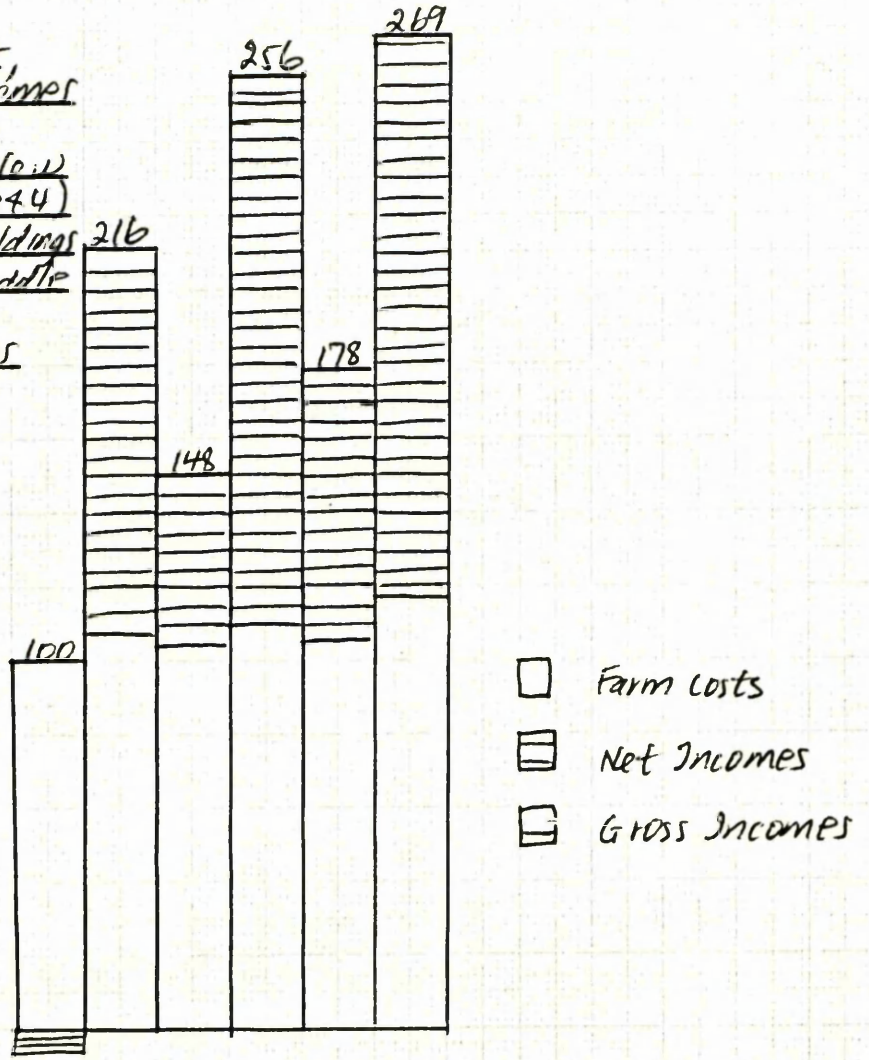
SL NO	Factors & Prices	1966	1975	Index: 1966=100
1	2	3	4	5
1	Land under cultivation (000)	148	382	259
2	Labour (Mill. man days)	32	49	153
3	Capital			
	3.1 Oxen ('000)	119	193	162
	3.2 Tractors (No)	40	255	637
	3.3 Fertiliser & New seed (000 Qtls)		76.2	
4	Price of Land (Birr/ha)	600[44]	800[44]	133
5	Price of Labour (Birr/day)	1.0	1.25	125
6	Share Cropping (of gross value)	1/3	½	151

Source: Land (table 6.11 disaggregated for Chilalo); Labour (table 6.30); Oxen, PMGSE Data Book on Land Use in Ethiopia 1982 p.283; Tractors, Cohen op. cit. 1972 p.199; Fertilizers and Seeds, Solomon et al Evaluation of ARDU, 1981 Table 27; Price of land, Cohen: 1972 p.201; price of Labour: Gills: 1978 p.109.

44. 1968-1972

Chart 6.4: Index of Per Hectare Cost, Gross Incomes and Net Incomes Comparison Between Pre-New Technology (Vill. 142 = 100), New Technology Using Farms (Vill. 344) Poor and Middle Peasants (Holdings of Less than 4 Hectares) Upper Middle and Rich Peasants (Holdings of >4 Ha) and Mechanized Farms at 1971 prices





Source: Case Study of 30 Farms & Table 6.26

The considerable gap between land under cultivation and labour supply (estimated in the 1966 participation rate) brings to the fore the overall labour demanding impact of the new technology (increasing input by those already participating, the rise in the rate of participation and/or the employment of wage labour).[45] In 1975, only about 10% of the traction and 17% of the mowing/threshing operations were mechanized.[46] Given the time constraint in agricultural operations even in single cropping rainfed agriculture,[47] the attainment of output increase largely by area expansion (rather than multiple cropping as in Asia) and the land saving nature of mechanical powered tractions, it is unlikely whether Arsi could have exposte attained the same level of output by altering (even if it were possible as in the revolutionary agrarian reform) factor proportions towards the use of the 'scale neutral' new technology inputs [48] and labour. Futhermore, the above aggregated analysis conceals the emerging new class formation, interclass differentials in the use of the technology, levels of efficiency (given the factor endowments

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45. We have not been able to assess the extent of intra-regional migration of labour which we reckon might have been substantial especially in the harvesting season. See section 4 table 6.3. on the extent of the hiring of labour and use of machinery services by the better off sections of the peasantry in the wake of the new technology.

46. Taking Holmberg's (Holmberg:1971) estimate of percentage of tractor hiring by 'small scale' farmers (10%) and assuming 70% of their cultivated land is mechanized plus the estimated holding of mechanized farmers and taking the breaking even level of efficiency of tractors for harvesters - 1000 hours at 200 man-day equivalent of work output (Ellis:1972; p.90).

47. Allowing for more ease in the distribution and use of the available labour supply if not net increase as in with multiple cropping.

48. Gills estimated a cost of US $80/ha (165 Birr) for wheat in mechanized farms. Of this, $53 (66%) worth, 5.9 qtls of wheat required foreign exchange. Compared to nearly 20 qtls of wheat per ha by mechanized farmers (table 6.26). If similar levels of efficiency were to be maintained, it would have required immensely adverse price ratio for mech. to become uneconomic..

especially land and access to credit,[49] the resulting use of factor proportions and the profitability this entails (Table 6.26). The use of factors, the proportions employed and their productivity can only be fully assessed within the context of the dynamics of both the forces and the relations of production. Given the land surplus, single cropping pattern in rainfed agriculture, the findings in Chilalo in the pre 1975 period suggest area expansion in agrarian development strategies with the use of mechanical power.

The empirical evidence from Chilalo suggests that when posited within a dynamic framework of agrarian transition initiated by a leap in agricultural technology, the relation between land productivity and farm size is contingent upon the type of resources used. The production function in turn is a function of the class position within the peasantry (owners and tenants on the one hand, poor and rich peasants on the other) and between the peasantry and the newly emerging mechanized farmers (as we shall see in section 5). One's social position to purchase the new inputs, the different levels of costs (with or without rent — Table 6.26) and probably also the managerial skills acquired in the process of the diffusion of the new technology inputs were the crucial variables in the adoption and their continual use.

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49. Both to purchase the new inputs and economy of scale attained in the lower per unit price of 'contract' (Table 6.26) for land under mechanization.

The increasing use of the new forces of production, the resulting rise in land and labour productivity, provided higher opportunities for renting out and/or use of previously grazing[50] and share cropping lands which in turn set in motion new agrarian relations. The rise in the price of land (by more than that of labour) led to an increase in the level and change in the type of share cropping tenancy, introduction of contract farming, increase in rental and tax surplus, the commercial surplus - a trend towards a new mode of production in agriculture. In the next section, we examine the simultaneous trend towards peasantization and differentiation in 1966-1975 and of peasantization in Arsi agriculture in 1975-1980.

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50. Rents from grazing lands varied inversely with their distance from sedentary agriculturalists. Lands yielding less rent than governmental taxes were termed as 'gebretel' remaining officially "unoccupied".

4.5 THE TREND TOWARDS PEASANTIZATION AND SOCIAL DIFFERENTIATION (1966-1975) AND PEASANTIZATION (1975-1980) OF THE ARSI PEASANTRY

The new profitability of agricultural production unleashed by the new technology in Arsi (from both increased land and productivity of land and labour) triggered rapid rises in the price of factors especially of land (table 6.31). Between the onset of the new technology and the agrarian reform of 1975, the share cropping rent increased from the general level of one-third of the gross value of output to half. There was also a trend in changes in agrarian relations from share cropping to a "free contract" lease of land and from rent in kind to cash. (table 6.36). While the cost of production for the poor and tenanted peasantry thus increased, the distribution of the new inputs and the benefits of their profitability were skewed in favour of the upper middle and rich peasants (table 6.32 and 6.35). First, although the seed/fertilizer technology and to some degree the distribution of credit were scale neutral in theory, their minimum availability in credit of one quintal and the higher profitability in the commercial crop, wheat (table 6.8) required at least a hectare of land.[51] It excluded the majority of the

51. We have not come across a study of the response to fertilizer (physical or value terms) but the recommended dosage for application was a quintal of DAP per hectare of wheat.

poor and lower middle peasants who had to maintain a sizeable portion of their farms for subsistence crops - barley on the highlands and maize on the lowlands. In the 1971 distribution season, 79% of the fertilizer was sold in lots of 2 and more quintals (table 6.32)

The size of the cultivated land of the CADU credit takers necessary to purchase the new inputs gradually declined in line with its policy of achieving rural and economic development by concentrating on farmers in the lower income bracket. However, even in 1974/75, the average size of the cultivated holdings of the new credit takers was over 3 hectares. The CADU Evaluation Team at the end of phase II (1970-1975) commented that "...CADU has never managed to make a major impact on very small farmers with holdings below 3 hectares" (Hunter et al: 1978, p.8). Taking the average use of nearly one-third of cropland for wheat in the four zones of Chilalo (Gill: 1978 p.121), and the fact of half of it being held by rich and upper middle peasants, nearly 53% of the new inputs were taken by 32% of the households (upper middle peasants) and 46% by 11% (rich peasants). (Table 6.32). 60% of the lower stratum of the peasantry had access to only 2.1% of the new inputs. A similar pattern of distribution emerges if we assume that the fertilizer was distributed as a percentage of holdings by peasant stratum. The increasing profitability of the new inputs, their unequal distribution and the changing social relations of production and the beginning of a shift towards polarization within the peasantry is vividly described by Holmberg:

"With the expansion of the monetary economy and increased affluence, the farmers became more inclined to hire labour on a regular wage basis than to plough and harvest with the assistance of neighbours and friends, the traditional way of carrying out this work". (Holmberg: 1972, p.93).

We present below the distribution of fertilizer by holding size, the changing pattern of factor use from the traditional ox/family labour technology to the new inputs and the associated profile of expenditure (including the hiring in of labour) in the pre and post-technology period. (See also chart 6.4 for a graphic presentation of the cost/return by pre and post technology, poor/lower middle and upper middle/rich peasants).

Table 6.32 Distribution of Fertilizer by Quantity in 1971

SL NO	Fert. in Qtls	HH		Qtls		
		No.	%	%	No	%
1	2	3	4	5	6	7
1	0	190	54	0	6	0
2	0-1	13	4	8	7	2
3	1	58	17	36	58	19
4	2	53	15	33	106	34
5	3	19	5	12	37	18
6	4	6	2	4	24	8
7	5	12	4	7	60	19
8	TOTAL	351	100	100	312	100

Source: Computed from
CADU Evaluating Studies: General Agricultural Survey. CADU No. 71 p. 49

Table 6.33 Distribution of the CADU Credit for Inputs (seed and fertilizer) by Average Size of Cultivated Ha of New Credit Takers (in Ha) 1967/68-1974/75.

SL	YEAR	Extension Areas	
		Gonde	Bekoji
1	2	3	4
1	1=68/69	70	
2	2=69/70	11	
3	3=70/71	10	7
4	4=71/72	6	4
5	5=72/73	6	4
6	6=73/74	5	3
7	7=74/75	4	3

Source: Jonsson I. Diffusion of Agricultural Innovations in Chilalo Auraja, Ethiopia, IDR, AA, 1975 p.96

Table 6.34 Per Household Cost/Return and Index (Pre-Technology Village=100) in Crop Production by Peasant Stratum and Adoption - Non-Adoption of the new Technology (in Ethiopian Birr at 1971 prices).

SL No	Cost and Return	Vill 1&2	Vill 3&4	<4 Ha	>4 Ha	Mechanized Farmers
1	2	3	4	5	6	7
1	Total Farm Cost	541	879	510	1,117	33,418
	1.1 Labour & Oxen	531	626	413	809	2,772
	1.2 New Inputs & hired labour	10	253	97	308	30,646
2	Gross Income	617	1430	695	1.623	70,070
3	Total Net Farm Income (2-1)	76	551	185	506	36,652
4	Land Rent	185	429	208	487	7,700
5	Return to Mgmt.	-109	122	23	19	28,952

1	2	3	4	5	6	7
1	Total Farm Cost	100	162	94	206	6,177
	1.1 Labour & Oxen	100	118	78	152	522
	1.2 New Inputs & hired labour	100	2530	970	3.080	306,460
2	Gross Income	100	232	113	263	11,356
3	Total Net Farm Income	100	725	243	665	48,226
4	Land Rent	100	232	112	263	416
5	Return to Mngmt.	100	111	21	17	26,561

Source: Computed from Village Studies op. cit. and CADU, Investigations on Mechanized Farming and its effects on peasant agriculture CADU No 74 Appendix 1 & 2 and holding of Mechanized Farms (Table 6.4).

Table 6.35 The Mean Level and Disposal of Farm Level Incomes in Dighellu & Yelema (1966), Assela (1971) and Ethya (1972) (in Ethiopian Birr).

SL No	Item	Dighelu & Yelema		Assela		Etheya	
		1967/68	%	1970/71	%	1971/72	%
1	2	3	4	5	6	7	8
1	Food	273	32	211	17	342	24
2	Taxes, Rent Centr.	34	4	193	16	84	6
3	Saving	38	5	50	4	85	6
4	Other	505[52]	59	483	39	333	23
5	Farm Inputs	10	10	309	25	588	41
	Fert & Seed	5	5	203	16	248	17
6	Hired Labour	5	5	35	3	63	5
7	Tractor & Comb	-	-	71	6	277	19
	Total	850	100	1,246	100	1,433	100
	No. Samples	10		11		124	

Source: CADU. A Case Study of peasant Farming in the Dighellu & Yelema Areas, Chilalo Awraja, CADU Publication No. 22 1969 p.76 CADU. Case Study of Farm Households in Assela Area CADU Publication No. 78 April 1972 p.29-31 CADU. Survey of Consumption Patterns in Etheya Extension Area, CADU Publication No. 90 Assela 1971. p.90

52. Sale of Live Animals.

Table 6.36 Change in the Mode of Payment of Tenancy Rent in Arsi in 1966 and 1968-72. (by% of peasants)

SL No.	Mode of Payment	% in 1968-72	% in 1966
1	2	3	4
1	Sisso arash (½ of GO)	36	47
2	Ekul arash (½ of GO)	35	39
3	Erbo arash (¼ of GO)	4	6
4	Contract	25	-
5	Other	-	16
6	Total	100	100

Source: CADU General Agricultural Survey CADU No. 82, 1972 p. 28; IEG, CSO A Survey of Arsi Province 1966 p. 21

GO = Gross output

A very profound change in the social relations of production in the pre-agrarian reform period was signalled by the mounting eviction of tenants, a trend towards the proletarianization of the peasantry[53] and the social tension to which it gave rise - which was a prelude to the agrarian reform of 1975.[54] Between 1966/67-1975/76, the area under mechanization increased from a mere 2,600 hectares to 30,400.[55] Mechanized farmers came from "above" (urban elites) who were known as "contract farmers"; and within the land owning rich peasantry and the proto-landlords. In the first major study of the process of mechanization, Henock describes the "contract" farmers as:

53. We have not been able to ascertain the form and extent of this proletarianization - seasonal labour from elsewhere, the Chilalo peasantry o from the adjacent urban centres. The latter migrated during the weeding season. According to the study by Henock, hired labour comprised only 8% of the cost of production (Henock: 1972: Appendix I and II) in mechanized farms.

54. The Chilalo peasantry's political role was duly acknowledged by the formative years of the Provisional Military Govt. of Ethiopia which allocated seats in the then Consultative Assembly to cooperative members from Chilalo and Wollaita, the two areas where the new technology packages were being disseminated. Just prior to the proclamation of the reform, a number of machines were burnt by the peasantry in the area. For a more detailed account of this period, see Ottoway D. & Ottoway M. Empire in Revolution, New York, 1978.

55/ See next page

"...generally government and court officials, businessmen or people involved in different lines of work other than farming...The mayor of Dera is[56] reported to farm 30-40 gashas (1,200-1,600 Ha) and there are many part-time farmers with farms of upto 20 gashas (800 Ha) (Henock: 1972, p.40).

Table 6.37 Area under Mechanization by Holding Size

SL NO	Holding Size in Ha	Farmers		Estimated Acreage		Col.6 / col.4
		No	%	Ha	%	Acreage Farmer Ratio
1	2	3	4	5	6	7
1	0-200	107	84.9	10,700	55.5	0.6
2	201-400	12	9.5	3,600	18.5	1.9
3	401-600	3	2.4	1,500	7.7	3.2
4	601-800	3	2.4	2,100	10.8	4.5
5	1.401-1,600	1	-	1,500	7.7	7.7
6	Total	126	100	19,400[57]		1.0
	$\bar{X}$			154		

Source: Cohen J.M. 1973 op. cit., p.199

Within the mechanizers, it was the "contract" farmers who expanded more rapidly (compared to these within Chilalo) with extensive cultivated acreages; units of as much as 1,500 hectares in an area where the seed/fertilizer/tractor/combine technology was unknown five years earlier. Twenty three mechanized farmers (19.3% of the total) cultivated 43% of the area (Cohen: 1972 p.199)

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55. The total area may have been close to 40,000 as 10% of sections of the peasantry used hired tractor and combine services (Holmberg: 1973 p. 92; Gills: 1978 p. 225).

56. Dera was a small municipality with a population of about 5,000.

57. Our estimate (table 6.41) probably under-rates the area under mechanization as we took 23,000 for 1971/72 and extrapolate 30,400 for 1974/75 whereas Cohen (1973 p. 199) gives 29,200 for the earlier period of 1971/72 when the momentum of the expansion of mechanized farming was quite rapid.

Table 6.38 Proportion (%) of Area under Mechanization in 1970 by Previous Type of Ownership.

	1968	1969	1970
Own Farms	64.8	61.9	47.5
Contract farms	35.2	38.9	52.5
Total	100	100	100

Source: CADU, Investigation on Mechanized Farming and its Effect on Peasant Agriculture, CADU No.72 Assela 1972, p.35

Amongst the peasantry, the trend towards the process of peasantization and social differentiation (1966-1975) and of peasantization (1975-1980) are given in the following tables.[58]

58. The theoretical and methodological issues in the social differentiation of the peasantry and its application to Ethiopia in the context of the tributary agrarian mode were discussed in chapter four.

Table 6.39 Change in the Size Distribution of Holdings and Acreage in Arsi in 1966-1975 and 1975-1980 by Peasant Stratum.

a) Holdings

SL No.	Strata	No. of Households						Change in No. of HH			
		1966		1975		1980		1966-1975		1975-1980	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	2	3	4	5	6	7	8	9	10	11	12
1	LL	21,600	15.7	35,225	17.7	0	0.0	13,625	+2.0	-35,225	-17.7
2	PP	35,831	26.1	44,778	22.5	60,846	25.8	8,942	-3.6	+16,068	+3.3
3	LMP	50,898	37.1	74,231	37.3	148,814	63.1	17,587	+0.2	+74,583	+25.8
4	UMP	24,242	17.7	15,921	7.9	20,990	8.9	-1,517	-9.2	+ 4,069	0.4
5	MP	(75,140)	(54.8)	(90,152)	(45.2)	(169,803)	(71.9)	(9,620)	(-8.9)	(78,651)	(+26.1)
6	RP	4,832	3.4	28,857	14.4	5,189	2.2	24,223	+11.1	-23,668	-12.3
7	CF	N.A.		246	0.3			246	0.1	- 246	N.A.
8	Total	137,200	100	199,258	100	235,838	99.4	63,058	0	35,580	0

b) Acreage

SL No	Strata	Hectares in Cultivation						Changes in Ha.			
		1966		1975		1980		1966-1975		1975-1980	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	2	3	4	5	6	7	8	9	10	11	12
1	PP	17,517	7.1	16,042	4.3	30,243	6.4	1,475	-5.6	+14,201	+2.1
2	LMP	102,017	44.6	111,346	21.3	297,628	63.2	+9,369	-19.8	186,282	+41.9
3	UMP	71,672	34.8	63,686	12.2	83,960	17.8	-7,988	-19.8	20,276	+ 5.6
4	MP	(173,689)	(79.4)	(175,030)	(33.8)	(381,588)	(81.0)	(+1,381)	(-43.9)	(206,558)	(47.2)
5	RP	26,640	12.0	249,953	56.4	52,863	9.5	268,303	+44.6	-197,090	-46.9
6	CF	2,617	0.1	30,378	5.8	6,206	3.0	28,361	+4.9	- 24,172	- 4.5
7	Total	224,509	100.9	522,700	100	470.900	99.9	298,384	0	- 51,800	0

Source: For 1966, IEG, CSO A Survey of Arusi Province, Addis Abeba 1966 pp. 17-19 and IEG, CSO Results of the National Sample Survey Second Round: Vol. V Land Area Utilization, Addis Abeba, February 1975, Statistical Bulletin No. 10 pp. 17-23; 1975-1980 PMGSE Area, Production and Yield of Major Crops for the Whole Country and by Region in 1974/75-1978/79, Addis Abeba, July 1979. ARDU Crop Sampling Survey in Arbagugu and Ticho, ARDU No. 8 Assela April 1977 p.1-22 ARDU Investigations on the Impact of Agrarian Reform on Peasant Income Income and Expenditure Pattern, ARDU 18 Assela 1971 pp. 24-25; ARDU Rural Population, Land Utilization Practices and Livestock Surveys, ARDU 13 Assela, August 1979.

The most remarkable change in 1966-1975 is the spectacular increase in the size of the rich peasant stratum (holdings of 5-10 hectares) - at the expense of the holdings of the upper middle peasants and by bringing new land under cultivation) which set aside the region's agrarian structure further from the rest of the country. If the sample surveys in the two periods are to be relied upon, the rural household number increased by 4.9% per annum for Arsi as a whole [59] (Appendix Table 8) suggesting immigration. [60]

With a rapid increase in hectarage in the same period, there was a general increase in the average hectarage of all sections of the peasantry (except the slight decrease for the middle peasants). It appears that most of the increased holdings of the rich peasants may have come from previously uncultivated grazing land held by the middle and to some extent of the poor peasants. For Arsi as a whole, the holding of 5-10 hectares increased from a mere 3.4% in 1966 to 14.5% in 1975 and their share of the hectarage from 12.7% to over 50% of the total (table 6.39 col. 4 and 6). The average level of hectarage (growth in holding less household numbers) of this stratum increased at a compound annual rate of 11% with all stratum of holdings except that of the

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59. It is interesting to note that before the agrarian reform, Arbagugu/Ticho's rural population increased at a higher rate than Chilalo's although even for the latter the net growth (immigration and emigration) is higher than the natural rate of increase of population. This is probably because of the movement of evicted tenants from Chilalo and/or other farming households from elsewhere because of push factors or the pull of the opportunities of the new technology which were widely believed to be spread further into Arbagugu and Ticho.

60. According to the only census in the country, population growth was given as 2.6% p.a.(PMGSE:1984).

poor peasants increasing (Appendix Table 8) - see also chart 6.5-9 for a graphic representation and the variation within Arsi between Chilalo and Arbagugu/Ticho.

The important trend in the percentage distribution of holding size (used as proxy for differentiation) in Chilalo between 1966 (pre-technology) and in the later period after the introduction of the new technology in Etheya: 1972 - where the technology has been introduced early in 1967 with 45% of the peasants adopting it (area north 1970); later in 1969-70 (area south: 1970); and without the technology (Bekoji: 1970) is shown in Appendix 6 Table 7.

At the onset of the agrarian reform of 1974/75, if our projections based on CSO 1966 and 1971 and the various CADU surveys (CADU 90, CADU 71) for the size distribution accurately portray the situtation, the Chilalo sub-province and to some extent Arbagugu and Ticho were in a rapid period of transition from semi-nomadism to petty commodity production. This was in order to meet the tax and rent obligations, and the trend towards the capitalization of agriculture by rich peasants and mechanized capitalist farmers[61] with the reinvestment of profits to finance the new inputs. In Chilalo, these made up 20.5% of the households but held 65.2% of the cultivated land (and as we shall see later nearly all the marketed surplus) most of which was under the commercial crop, wheat.

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61. In 1972 in Etheya where the technology was introduced earlier in 1967/68, 10% of the farmers reported having used tractor and combine service (Holmberg: 1973, p.92). Later, in a sample of 220 farmers in all the four zones of Chilalo, 10.4% of the sample farmers used tractor and combines (Gills: 1978, p. 255).

The holdings under the rich peasants may have been underestimated as in this period Chilalo underwent a rapid rate of mechanization partly by rich peasants hiring in machinery services. [62]

Following the agrarian reform of March 1975, which among others limited the size of individual holdings at 10 hectares, the official prohibition of the hiring in of labour, the rapid ascendancy of the rich peasants and the trend towards the development of capitalist agriculture was not only halted, but drastically reduced. [63] With the redistribution of holdings to the landless poor, and middle peasants from rich peasants in the post reform period, the structure of holdings appears to have reverted to 1966 - prior to the introduction of the new technology. The middle peasants (especially the lower middle ones) were the most numerically dominant strata of the peasantry. While the number of the lower middle peasants increased by 25.8%, that of the rich peasants declined by 12.3%. The upper middle peasants and the poor peasants appear to have stabilized at nearly one tenth and one quarter of the households (table 6.39 columns 4 and 6 and charts 6.7 and 6.8). The holdings

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62. The CADU project surveys often excluded such holdings from the sample frame as these farmers were outside of the target population (which consisted of land-owners with holding hectares of 0-20 hectares and tenants with 0-40 hectares (CADU: 71). The CADU source material in general is thus weak with regard to mechanized farmers.

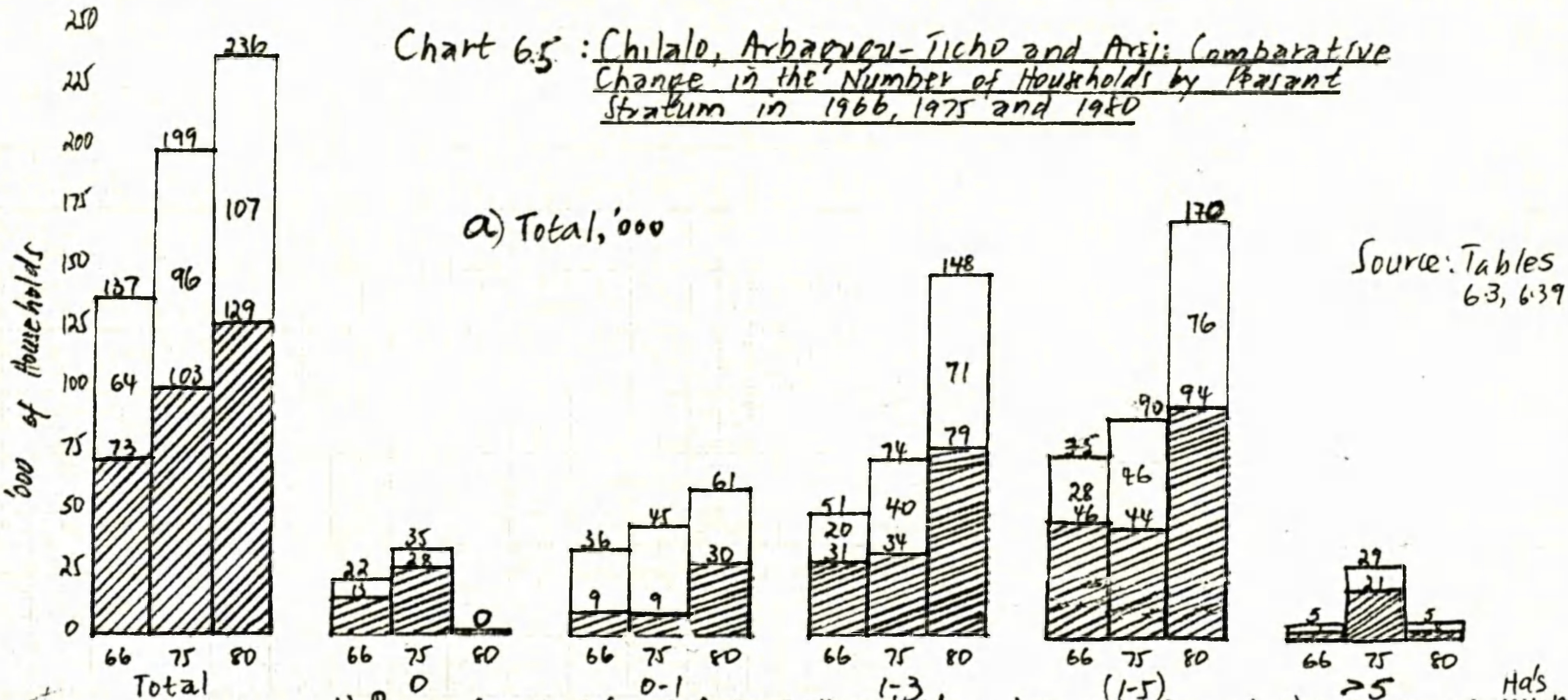
63. For the implementation of specifically this provision of the reform, see Rahmato, D. Agrarian Reform in Ethiopia, Scandinavian Institute of African Studies, 1985 and Aster Akalu The Process of Land Nationalization and Distribution, Bloms Boktrycken, 1982.

of rich peasants decreased by 45.2% with a 37.6% increase in the holdings under lower middle peasants. The per household land under cultivation increased for poor and middle peasants. With the agrarian reform of 1975 the trend towards social differentiation of the peasantry set in motion by the new technology was reversed towards middle peasantization, the implication of which to the flow and type of marketed surplus, given the new agrarian structure, is set out in the following section.

Chart 6.5: Chilalo, Arbagugu-Ticho and Arsi: Comparative Change in the Number of Households by Peasant Stratum in 1966, 1975 and 1980

a) Total, '000

Source: Tables 6.3, 6.39

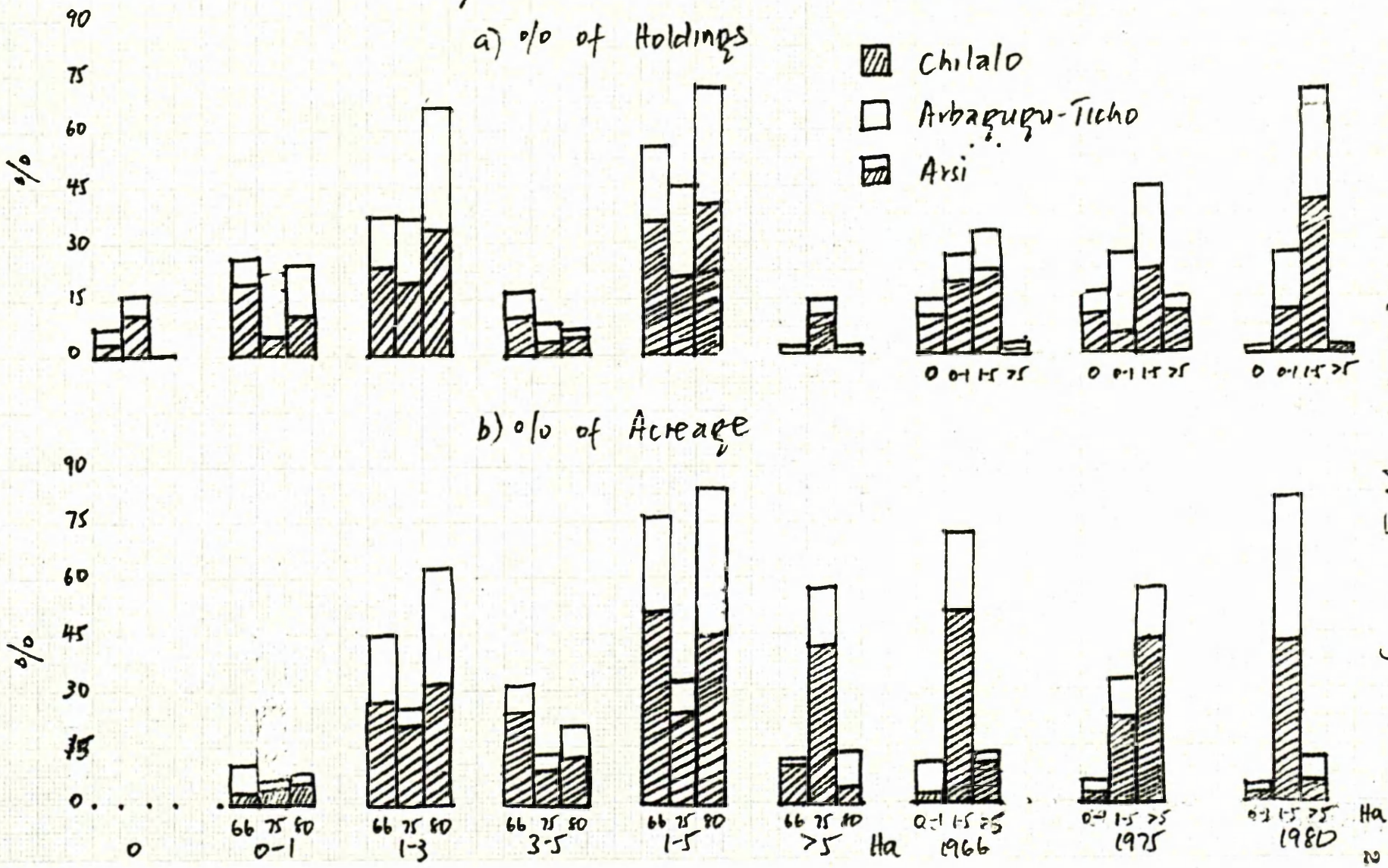


b) % age Growth Rates of Acreage, Households and Per Capita (Household) In Acreage in 1966-19..

No	Hldg Size	Area under Crops: AGG/Ticho I	AGG/Ticho II	Chilalo I	Chilalo II	Arsi I	Arsi II	No. of Households: AGG-Ticho I	AGG-Ticho II	Chilalo I	Chilalo II	Arsi I	Arsi II	Ha Per Capita (by Household) in Arsi I	II
1	0							-2.3	0	9.8	0	6.3	0		
2	0-1	-1.1	-1.1	5.2	18.9	-1.6	6.1	3.7	-2.3	-0.1	21.4	2.8	5.2	-4.4	0.9
3	1-3	-3.2	36.3	3.3	13.5	1.0	23.7	9.5	9.7	9	15.0	4.8	12.3	-3.8	10.4
4	3-5	-0.5	-9.6	-1.9	4.0	-1.5	5.7	-4.0	-5.3	-4.8	6.0	-8.2	4.7	6.7	1.0
5	(1-5)	(-2.3)	(29.0)	(1.1)	(10.5)	(0.0)	(16.9)	(6.0)	(8.4)	(0.7)	(13.6)	(2.3)	(11.1)	(2.3)	(5.8)
6	5-10	219	-77.3	30.2	-36.1	35.0	-29.1	28.6	-36.3	24.7	-2.1	25.7	-24.1	10.3	-5.0
7	Tot.	8.0	9.8	12.5	-8.4	11.1	-2.1	5.2	1.7	4.4	3.9	4.8	2.9	6.3	-5.0

AGG = Arbagugu I = 1966-1975; II: 1975-1980

Chart 6.6 : Changes in the Distributions of Holdings and Cultivated Land in Chilalo, Arba-Guqu-Tiche and Arsi in 1966, 1975 & 1980



Source: Tables 6.3, 6.39

4.6 THE NEW TECHNOLOGY, AGRARIAN REFORM, INCOME DISTRIBUTION AND THE MARKETED SURPLUS IN ARSI AGRICULTURE 1966 - 1980.

The preceding presentation of the dynamics of holdings associated with the new technology and the agrarian reform of 1980 attempted to provide a framework within which to examine the specific process of the trend towards differentiation and peasantization of the Arsi peasantry. However, they underestimate the extent of variations in incomes. While a complete and time series data on input distribution by holding size within the peasantry is lacking, the rich and upper middle peasants purchased most of the inputs (Table 6.32 and 6.33) with considerably increased incomes which were more than implied by their holding sizes because of:-

i. vastly increased yields per hectare compared with those not using the technology (cf. land and labour productivity with and without the technology in section4).
ii. increased incomes per hectare as holding size increased (cf. section 4).
iii. change in crop mix to the high valued crop, wheat on which most of the new inputs were used (cf. section 3).

Prior to analyzing the distribution of incomes in Arsi as a whole, we present below the comparative structure of holdings between the case study villages and Arsi in 1966, 1974/75 and 1980.

Table 6.40 Comparative Holding Structure in Ha of the Case Villages and Arsi in 1966, 1974/75 and 1980.

SL NO	Holding Size(Ha)	4 Villages*	Arsi 1966	Arsi 1974/75	Arsi 1980
1	2	3	4	5	6
1	PP	3	31	27	26
2	LMP	23	44	45	63
3	UMP	50	21	10	9
4	MP	(73)	(65)	(55)	(72)
5	RP	17	4	18	2
6	CF	7	NA	0.1	-
7	Total	100	100	100.1	1oo
8	$\bar{X}$	4.2	1.94	3.2	1.99

Source: Tables 39 and 40 and Case Studies of Peasant Farms 1967, 1971 and 1975/76.

* The data for the villages refers to 1966 (Dighellu and Yelemaj), 1971 (Assela) and 1974/75 (Assassa).

Table 6.41 Area under cereal Cultivation in the Case Villages and Arsi in 1966, 1974/75 and 1980.

SL NO	Crop	4 Villages	Arsi		
			1966	1974/75	1980
1	2	3	4	5	6
1	Wheat	37	22	38	25
2	BARLEY	33	44	30	35
3	Sub-total	(70)	(66)	(68)	(60)
4	Total	100	100	100	100

Source: As in Tables 6.40 and 6.41

While the village studies are biased towards upper middle peasants instead of the most numerous lower middle peasants for Arsi in all the periods, they underrepresent the poor peasants. The general pattern of holdings, mean cultivated land especially in 1974/75 and the proportion of land use by the two main cereals in all the periods are however similar. Moreover, the estimates by holding size of land productivity used for Arsi from the village studies is not very far from the direct estimates of output obtained for Arsi as a whole in section 6.3 as we shall see later.

Table 6.42 Total Net Farm Incomes of the Case Farms (1967, 1971 and 1974/75) in Birr at 1971 Prices by Income Levels

SL NO	Net Incomes in Birr	Vill. 1&2		Vill. 3&4		<4 Ha		>4 Ha		All	
		No	cum%	No	cum%	No	cum%	No	cum%	No	cum%
1	2	3	4	5	6	7	8	9	10	11	12
1	0-300	3	30	2	10	2	15	3	20	5	17
2	301-600	5	80	2	20	6	54	1	27	7	40
3	601-900	2	100	5	45	3	74	4	52	7	63
4	901-1,200			6	75	2	87	4	80	6	83
5	1,201-1,500			1	80	1	100	0	80	1	86
6	>1,500			4	100	1		3	100	4	100
7	Total	10		20		15		15		30	
8	$\bar{X}$						650				

Source: Computed from Village Studies

100% of the households in villages 1&2 earned less than 1,000 Birr per household (per capita of about $200), in villages 3&4 as many as 60% of the household incomes were over $1,000. In the latter the top 10% received an average income of $4,000 (3,205 & 4,789) - four times the average for villages 1&2.

The wide variations in incomes are not only because of the generally higher levels of holding sizes in the new technology villages, but more because of the higher productivity of the new technology as demonstrated in the following tables (cf. the ratio of households, hectarages and incomes where 0.77>0.54>0.42 and 1.11<1.15<1.28 for villages 1&2 and 3&4 respectively).

Table 6.43 Ratio of Households, Hectarages and Incomes

SL NO	Production Unit	%HH	%Ha	%Income	Ha+HH	Income+Ha	Income/HH
1	2	3	4	5	6	7	8
1	Villages 1&2	33	25.5	14.2	0.77	0.54	0.42
2	Villages 3&4	67	74.5	85.8	1.11	1.15	1.28
3	<4 Ha	50	31.9	31.4	0.64	0.57	0.37
4	>4 Ha	50	68.6	81.5	1.36	1.20	1.63
5	Total	100	100	100	1.00	1.00	1.00

HH = Household
Ha = Hectare

Source: Computed from Village Studies

Within the generally high levels of incomes in villages 3 and 4, they are more unequally distributed compared to villages 1 and 2. The bottom 50% of the households in villages 1 and 2, shared 35% of the gross incomes from crops and animals while the corresponding levels for villages 3 and 4 was only 25%.

Based on the distribution of holdings (CSO 66, 71 pp.17-19, 17-23; PMSGE: 1980. p.59; ARDU 8, '77 p.25-26); area under different crops (CSO: 1966, 1971; PMSGE; 1980, 1982); estimates of total output in section 3, the levels of productivity from the case study farms (section 4.4) and assuming 12½% of the poor peasants (½ qtls each), 20% of the lower middle peasants (1 qtl each) and 53% of middle peasants, 80% of the rich peasants (based on area under acreage and sale of fertilizer) and 100% of the mechanized farmers used fertilizers; and applying the productivity level of holdings of < 4 HA for holdings 1 - 5 and of > 4 Ha for the rest (cf. section 4), we estimated the level and distribution of gross farm incomes in Arsi in 1966 and 1974/75 as in the following table.

Table 6.44 Distribution of Income in Birr by Peasant Stratum in 1966 and 1974/75 in Arsi at 1971 Prices

SL NO	Holding Size in Ha	1966				1974/75			
		No.of HH	Income in Mil. Birr	Y/HH	Y/HH Index	No.of HH	Y(Mill)	Y/HH	Y/HH Index 1966= 100
1	2	3	4	5	6	7	8	9	10
1	PP	35,836	3.7	103	100	44,778	3.7	83	80
2	LMP	50,898	16.8	330	100	74,778	20.7	279	84
3	UMP	24,242	11.8	487	100	16,921	17.6	1,040	213
4	MP	(75,141)	(28.6)	(380)	(100)	(91,152)	(38.3)	(420)	(110)
5	RP	4,624	4.4	951		28,857	91.6	3,174	334
6	CF		1.0			246	13.8	36,097	
7	Total	115,600	37.6	325	100	163,787	147.3[64]	824 (940)	253

HH = Household

Y = Income

Source: Table 6.43 and 6.44

64. The discrepancy in incomes of 15.7 million Birr estimated in section 3, Table 6.16 and above in Table 6.44 is because of the inclusion of incomes from animals in the village study models. With income from animals being nearly 20% of farm incomes (Holmberg: 1973m Leander: 1967), the two estimates however are quite close.

Arsi region's emergence as the most important surplus grain region for Ethiopia was shown in section 6.2. While agricultural income from crops increased more than twice between 1966-1974/75 for Arsi as a whole, the per household income position of the poor and lower middle peasants worsened. The dramatic rise in income levels for the upper middle peasants, rich peasants and capitalist/mechanized farmers is obvious.

In the post reform period, in view of the new agrarian structure and the lowering of per household distribution of fertilizer within the overall 28% households using it, (table 6.32 in section five) we estimated use of fertilizer by 3% of the poor peasants, 32% of the middle peasants and 34% of the rich peasants. We also used the productivity level of holdings of less than 4 hectares in the villages study as holdings of 4 hectares made up less than 10% of the acreage in 1980.

Table 6.45 Distribution of Income in Birr by Size of Holding in 1974/75 and 1980 in Arsi at 1971 Prices

SL No.	Holding Size in Ha.	1974/75				1980			
		HH No.	Birr in Mill.	Y/HH	Index 66=100	HH No.	Mill.	Y/HH	Index 1966=100
1	2	3	4	5	6	7	8	9	10
1	(0-1) PP	44,778	3.7	83	80	60,846	5.6	92	89
2	(1-3) LMP	74,231	20.7	279	84	148,814	66.4	446	135
3	(3-5) UMP	16,921	17.6	1,040	213	20,990	24.4	1,162	239
4	(1-5) MP	(91,152)	(38.3)	(420)	(110)	(169,803)	(90.8)	(535)	(141)
5	(5-10) RP	28,857	91.6	3,174	334	5,189	15.5	2,987	314
6	>10 CF	246	13.8	56,097 (940)	NA		2.2		
7	Total/$\bar{X}$	163,787	147.3	824	253	235,838	114.1	475	146

Source: Tables 6.32, 6.38 and 6.42

HH = Household Y = Income

Table 6.46 Distribution of Households and Income from Crops in 1966, 1974/75 and 1980.

SL NO	Holding Size in Ha	1966		1974/75		1980		%Income/% HH		
		% of HH	%of Y	% of HH	% of Y	% of HH	% of Y	1966	74/75	1980
1	2	3	4	5	6	7	8	9	10	11
1	FP	31	10	27	3	26	5	0.32	0.11	0.19
2	LMP	44	46	45	15	63	59	1.04	0.33	0.94
3	UMP	21	32	10	14	9	22	1.52	1.40	2.40
4	MP	(65)	(78)	(55)	(28)	(72)	(81)	(1.20)	(0.51)	(1.12)
5	RP	4	12	18	68	2	13	3.0	3.8	6.5
6	Total	100	100	100	100	100	99	1.0	1.0	1.0

Source: Derived from Tables 6.42 and 6.43.

Given the post reform agrarian structure, we tried to assess the impact of the new agrarian structure on the related tax, the post-reform price trends, the levels of incomes of the different strata of the peasantry and their implication to the contribution of Arsi's agriculture to non-agriculture: specifically in the realm of cereal supply (in absolute terms and terms of trade between agriculture and non agriculture and inputs and output prices) and the demand for the new technology inputs. Using the simple demand and supply model developed in the analysis of farm output and its disposal described in chapter four section six, we estimated the distribution and composition of the 1966, 1974/75 and 1980 output by peasant strata and in aggregate as in the following tables.

Table 6.47 Arsi: The components of the Output of Cereals in 1966, 1975 and 1980

a) Total & Time Index

Sl No	Components of Output	Output (000 tons) 1966	1975	1980	Index 1975 1966=100	1980 1975 = 100
1.0	Total Output	188	736	570	391	77
2.0	Taxes	6	22	17	366	77
3.0	Rent	32	147	-	671	-
4.0	Obligatory Surplus	38	169	17	381	10
5.0	Inputs	-	12	15	-	125
6.0	Gross Disposal for cons (1-4)	150	567	553	393	97
7.0	Effective Cons. Demand	113	180	227	159	126
8.0	Min. Cons Demand	139	210	240	151	114
9.0	Commercial Surplus ((5+6-8)	38	399	341	1050	85
10.	Total Marketable surplus (4+9)	75	568	358	757	63
11.	Deficit of Marginal Peasants (8-7)	26	30	13	115	43
12.	Net Marketed Output(10-11)	51	526	345	1031	65

b) Ratio Index: Total Output = 100

1.0	Total Output	100	100	100
2.0	Taxes	3	3	3
3.0	Rent	17	20	-
4.0	Obligatory Surplus	20	23	3
5.0	Inputs	-	2	3
6.0	Gross Disp. for cons.	80	77	97
7.0	Effective Cons. Demand	60	24	40
8.0	Min. Cons Dem.	74	28	42
9.0	Comm. Surplus ((5+6)-7)	20	54	59
10.0	Total Market. Surplus (4+9)	40	77	63
11.0	Deficit of Marg. Peasant	14	4	2
12.0	Net Marketable Output (10-11)	27	71	60

Source: Tables 6.4, 6.15 & 6.16 converted into grain equivalents and for consumption, obligatory surplus etc. as set out in chapter four section six.

In all periods, the poor peasantry faced a deficit of its minimum level of consumption (Chart 6.5). Together with the landless, their deficit accounted for 14% 4% and 2% of the total regional output (Table 6.47) in 1966, 1974/75 and 1980 respectively. Between 1966 and 1975, while the area under cultivation increased by 2.3 times, total output, marketable surplus, the commercial surplus and the net marketed output increased by 3, 9 7.6, 10.5, 3.4 respectively. Despite the more than natural rate of increase of population, the percentage of farm level consumption of total output declined from 74% to nearly 25% of the gross output of cereals. The commercial surplus increased from a mere 20 to 54% of the total output. Within the net marketed output, the share of the commercial surplus increased from 50% to 77% and vice versa for the obligatory surplus although the latter also increased in absolute terms in proportion to crop incomes. In the same period, the share of the rich peasants and the mechanized farmers estimated contribution to the net marketed output increased from nearly ½ in 1966 to close to 100% in 1975. Their share of the commercial surplus increased from 20% to 80%.(Table 6.47 and charts 6.7.-6.9).

The agrarian reform and the new agrarian structure respectively abolished landlordism, decreed to reverse the trend towards the social differentiation of the peasantry and the development of agrarian capitalism and implemented a redistributivist agrarian reform levelling the size of the holdings.[65] The new agrarian policy

65. The result of this in Arsi and the differential pattern of holdings in 1966-1980 in Chilalo with the technology and in the post agrarian reform period, that of Arbagugu/Ticho with the new technology and agrarian reform is shown in tables 6.42 & 6.43 and vividly in charts 6.6 & 6.8.

also changed the basis of appropriation of surplus by instituting a uniform set of taxation of 20 Birr/peasant household and if somewhat sporadically the requirement of fixed delivery of a portion of the peasant's cereal output at fixed prices in lieu of the pre-agrarian reform rent (nearly 17% of gross output and state tax of 3% of the gross output). (Dessalegn: 1985).

In the post reform period, the index (1975 = 100) of cultivated land, total output, gross marketable output, the commercial surplus and the obligatory surplus declined by 10, 23, 27, 65, and 90 respectively. The higher decrease in the latter reflects the dramatic fall in the level of the obligatory surplus with the remission of rent. The only index which increased was the levels of the consumption demand. The proportion of farm level consumption increased by 14% per annum accounted for by the ownership of holdings by formerly landless peasants, population growth and perhaps also because of immigration. The food deficit of the poor peasantry declined appreciably although farm level production still fell short of minimum levels of consumption requirement. (See charts 6.7 and 6.8) for the distribution of the components of output by peasant stratum . More importantly, the increase in the level of consumption is also due to the change towards middle peasantization (where they made up 55% of the agrarian households in 1966, 45% in 1975 and 72%in 1980).

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66. The fixed prices of cereals were nearly 40% of the "open" market price. In 1982 as the state purchased 306,000 tons which was 50% of the estimated net marketed output (GOE/WB: Annex 2, Table V@4 and V5).

In the same period (1975 - 1980), side by side with middle peasantization, except for teff, the level of output of all other crops in Chilalo, which had most of the mechanized and rich peasant farms, declined. In Arbagugu/Ticho on the other hand, where the new technology was introduced with the agrarian reform, acreage under all crops increased but did so more for the subsistence crops. For Arsi as a whole, while the fall in acreage (although by less than output) is accounted for by the commercial crop wheat, there was a modest growth for all other subsistence cereals(Chart 6.4). By 1980, middle peasantization, the new technology and the redistributivist agrarian reform increased and more equally distributed the levels of agricultural incomes compared to 1966. Simultaneously in the post reform period, this has been accompanied by a fall in the marketable surplus of cereals and the rural/urban linkage reducing the capability of an important policy instrument for national accumulation strategy. Furthermore, the period has been marked by a sharp rise in the relative price of cereals and within the coarse cereals affecting the rural and urban poor and with it the accumulation objectives towards industrialization. While the overall effect of this price trend is considered in the next chapter for Ethiopia as a whole, we present below an index of retail prices in Assela and other market centres to draw inferences about the distribution of incomes and terms of trade by peasant strata.

Table 6.48 Index of Average Retail Prices in Selected Centres in Ethiopia for Selected Commodities in 1980 - 1975=100

	Addis Abeba Index	Assela	Bahr Dar	Shashemenie
Teff	243	157	120	155
Sorghum	300	-	-	184
Wheat	213	171	156	241
DAP Fertilizer	-	131	131	131
Canvas Shoe	211	202	197	226
Sugar	150	145	114	229
Salt	260	123	120	197
Khaki	197	165	232	172
Wages[67]	153	128	168	186
Ratio[68]	0.8	1.1	1.4	1.0

Source: Government of Ethiopia/World Bank Mission - Ethiopia Review of Farmers, Incentives and Agricultural Marketing and Distribution Efficiency, 1983, pp.108-112 and PMGSE, A Report on Retail Prices of Goods and Services in Selected Towns, Statis. Bull. No.28 1981, pp. 4-6, 16-18, 25-27, 70-72

The index level of wages and fertilizer (which had a uniform national price) were lower than cereal prices and/or the price of non-agricultural consumption goods demand in rural Arsi. Using the price index for Assela in 1975-1980 (1975=100) above, the main commercial crop, wheat, fertilizer (DAP), the increasingly important cereal teff, weighted index of urban consumption goods (sugar 0.2, salt 0.2, khaki 0.3 and canvas shoes 0.2), and wages, a comparative index ratio cross tabulation gave the following result.

67. Taking the rural average daily wage of Birr $1.52 in 1975 for Arsi as a base (which is an underestimation for the other urban centres even for urban Arsi) and the 1980 wage levels reported in PMGSE: 1982,p. 16-18 .
68. The average index of canvas shoes and khaki divided by the average index of cereals. Being unweighted for quantity, they do not of course indicate even a crude barter term of trade.

Table 6.49 The Comparative Price Ratios of Cereals (Wheat and Teff), Fertilizer, Industrial Rural Consumption Goods and Wages in Assela in 1975-1980

SL NO	Item	Index 1975=100	Wheat	Teff	DAP	Wages	Ind Cons.Goods
1	2	3	4	5	6	7	8
1	Wheat	171	1.0	1.1	1.3	1.3	1.00
2	Teff	157		1.0	1.2	1.2	1.00
3	DAP	131			1.0	1.o	0.80
4	Wages [69]	128				1.0	0.80
5	Ind.Cons. Goods	164					1.0D

Source: Table 6.46
Ind. Cons. = Industrial Consumption

The price of the main marketed crop in Arsi, wheat, increased in relative terms to a level higher than the high valued subsistence crop, teff, and in relation to both the price of the main purchased input DAP and rural wages while it remained in line with that of a basket of urban made rural consumption goods. This suggests a favourable term of trade for the main marketed output, wheat, in relation to the increasingly important teff, to purchased inputs (fertilizer) and labour that might be hired and a constant terms of trade with non-farm consumption goods.

In the same period, however, unlike the 1966-1975 period, the output of wheat, and more significantly in Chilalo, declined, this coinciding with the redistribution of holdings in favour of marginal, poor and lower middle peasants,

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69. Considering barley as the subsistence good par excellence, it could have been more instructive to compare its price with that of rural wages, although the price of wheat is adequate for the income effect of the relationship between wages and agricultural product prices.

and with the aggregate fall in the rate of tax-rent obligatory surplus. This decline was, however, proportionate to the decline in incomes, especially that of the upper echelons of the peasantry. Based on the land redistributive impact of the reform, the use of fertilizer, the new tax, and the price of agricultural labour, and making a reasonable assumption about change in its demand, the weighted price ratios for inputs and output and the estimated price and barter term of trade between agriculture and non-agriculture, we have attempted to measure the net income, redistributive effect and the accumulation implication of the agrarian reform.

Table 6.50 Per Household Percentage Change in Income of the Different Strata of the Peasantry in 1975-1980

SL No	Peasant Stratum	Redis-tribut-ion[70]	Wage Transfer	Rent[72] Tax	Price[73] of Input	Income[74] TT	Total
1	2	3	4	5	6	7	8
1	PP	- 4	-35[71]	+8	+2	NA	-29
2	LMP	+47	NA	+17	+1	+4	+69
3	UMP	+17	NA	+19	+1	+7	+34
4	MP	(+21)	NA	(+17)	+1	(+4)	(+43)
5	RP	-10	NA	+20	+1	+9	20
6	CF	-	NA				+NA
7	Total	-44	NA	+18	+1	+5	-20

NA = Not Applicable: Assuming hiring in and hiring out by the middle peasantry balance out.

TT = terms of Trade

70. Table 6.39 and 6.40 (Col. 5 & 9)

71. Deduced from the 185 Birr minimum survival need of a peasant household of which 100 Birr is earned from crop incomes and a deficit of 65 Birr (for consumption) and 20 Birr tax as in Tables 6.44 and 6.45 were met by wage employment. And we assumed a fall in the demand for wage by 50% following redistribution of holdings (from 3.8 mill. birr in 1975 to 1.9 mill) and a 25% fall in the wage/wheat price ratio computed above on a per capita basis (Table 6.49) by number of households in 1980=23.4 Birr of 35% of gross survival income.

See next page for notes 72-74.

The net effect of the new technology in Arsi has been increasing inequality, social differentiation and accumulation and the redistribution of incomes through holding size in 1966-1975. The credit for new technology inputs (from mechanized farmers and emerging capitalist rich peasants), favourable output/input price ratio, a marked fall in the rate of the obligatory surplus (formerly due to the proto-landlord and currently the state) and less conclusively in the betterment of the price terms of trade (from workers to the peasantry) increased the income of the middle peasants in 1975-1980. The redistributed income and the barter terms of trade favoured the lower middle peasantry by as much as 70% of their 1975 levels of incomes compared to 1980. The position of the poor peasants (many of whom may have been formerly marginal and landless peasants worsened due to the actual shrinkage of the labour market (both because of the Proclamation and the drastic fall in the holdings of the rich peasants and mechanized farmers and wage/consumption industrial gross ratio) on the one hand and adverse wage/crop and wage/rural and urban consumption/goods price ratio reducing the purchasing power of wage incomes. The previously tenanted rich

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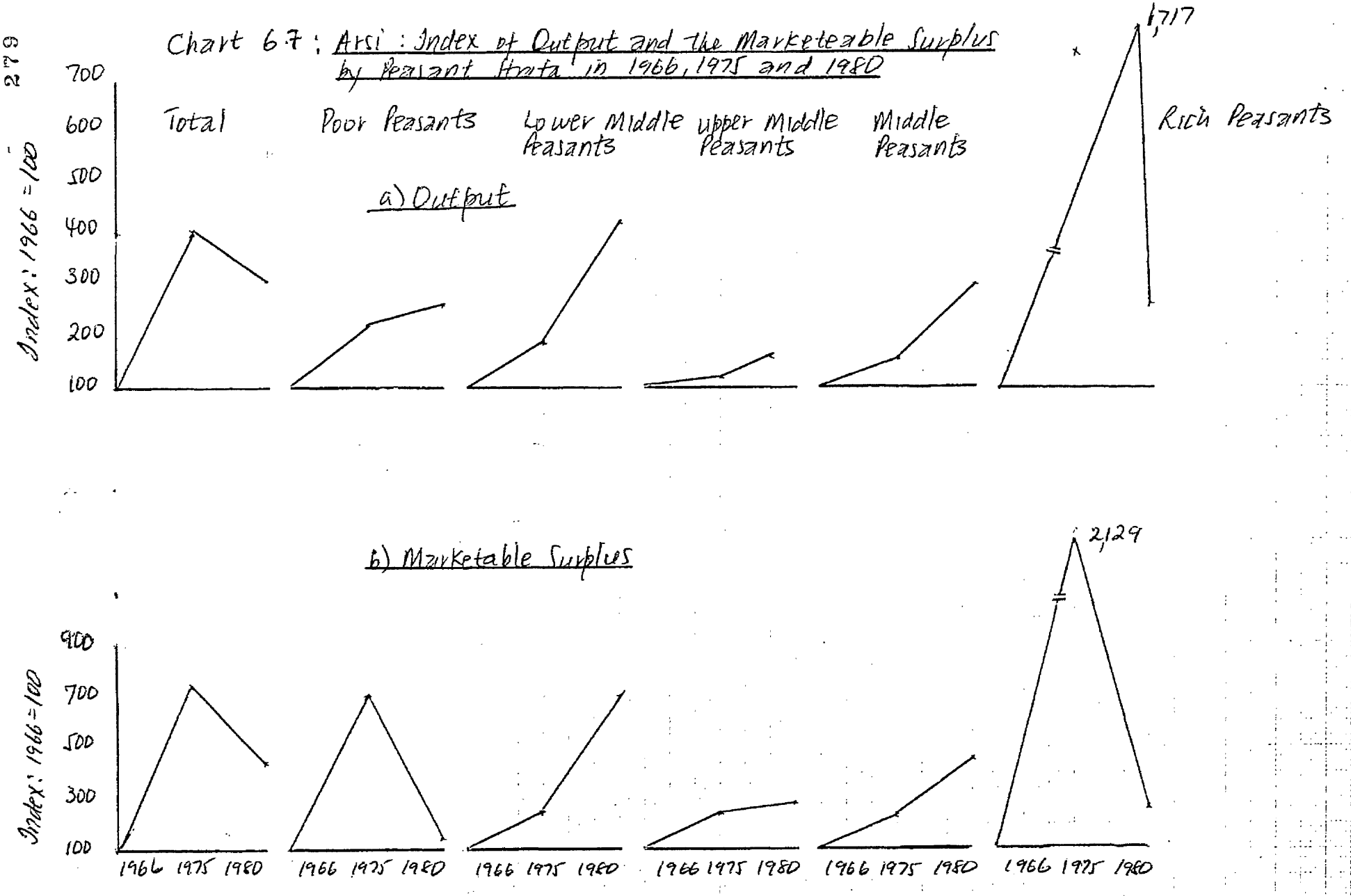
72. Table 6.47 - the 1980 20 Birr/household deflated by 100% level of inflation slightly higher than the Assela index of price of wheat to take into account the higher level of price increases in Addis Abeba where the funds are used.
73. The price ratio in table 6.49 and its share of average farmer incomes in tables 6.49 and 6.45 and used in table 6.51.
74. The estimated change in the value of net per capita marketed output by each strata multiplied by the wheat urban consumption goods index ratio.

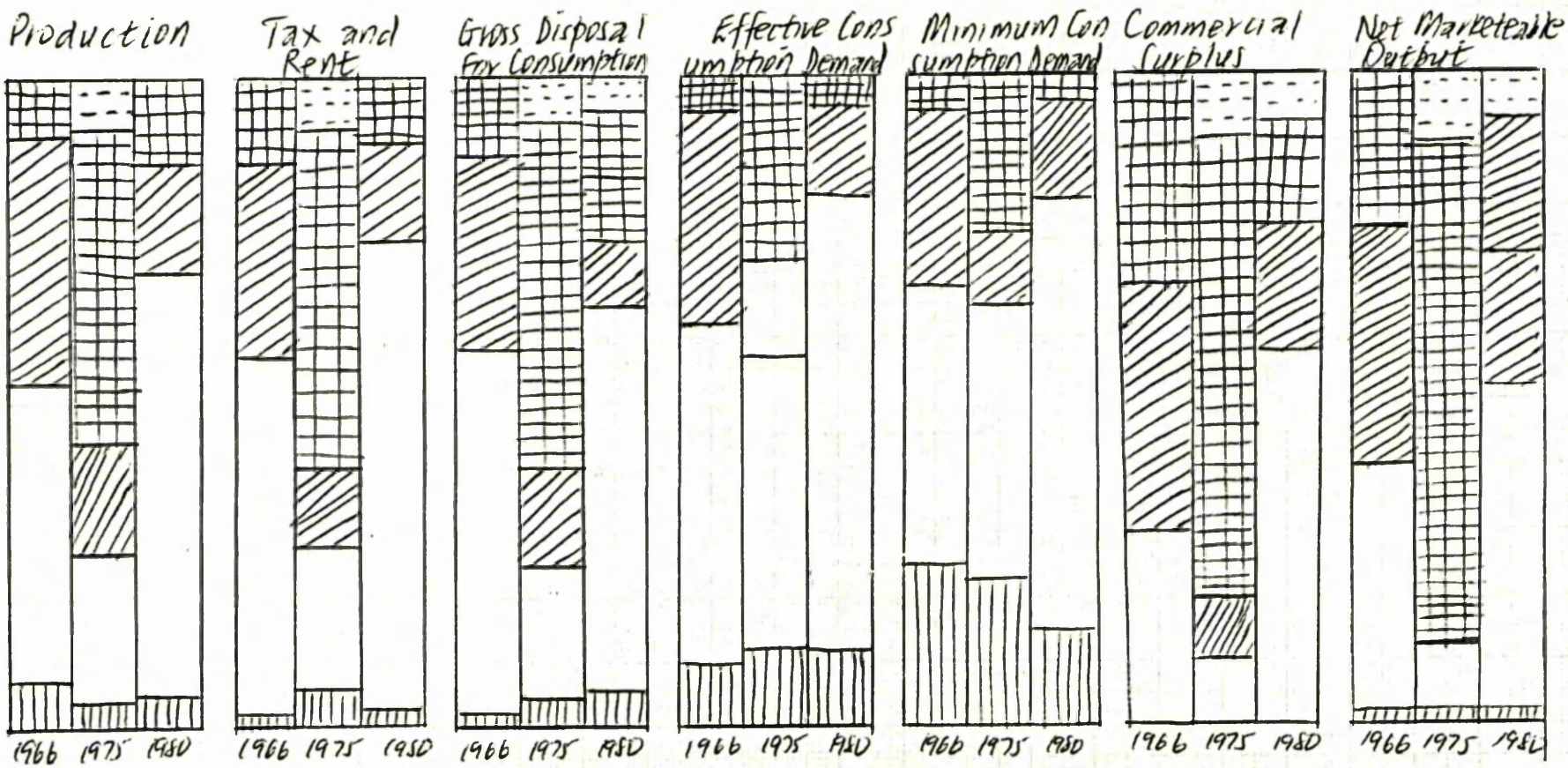
peasants were the most to benefit from the changed levels of obligatory surplus. The post-1975 state is in the process of successfully abolishing the relations of production of agriculture in the pre-1975 tributary state. By doing so, its policy measures appear to have increased the level of farm consumption but also slowed down the tempo of the development of the productive forces especially in increasing the cultivated frontier,possible fall in land productivity and the net marketed output with adverse terms of trade to non-agriculture. The implications of the post-reform period agrarian structure, the new technology and their implications for equity and accumulation are taken up at a more macro level in chapter seven.

Chart 6.7 : Arsi : Index of Output and the Marketeable Surplus by Peasant Strata in 1966, 1975 and 1980



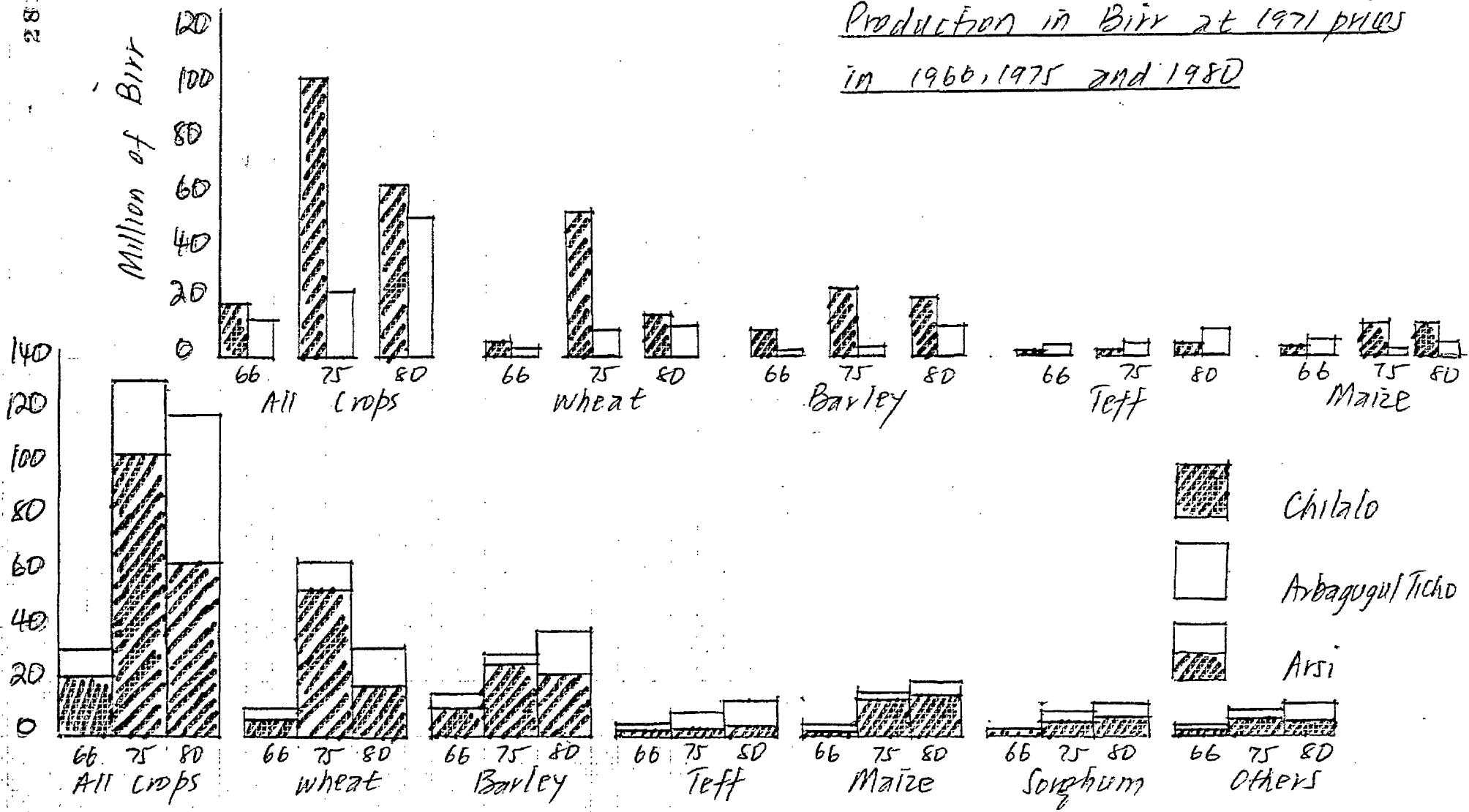
Source: Tables 6.15, 6.16, 6.39, 6.40

Chart 6·8: Arsi: % Distribution of Cereal Output and its Disposal in 1966, 1975 and 1980 by Peasant Stratum



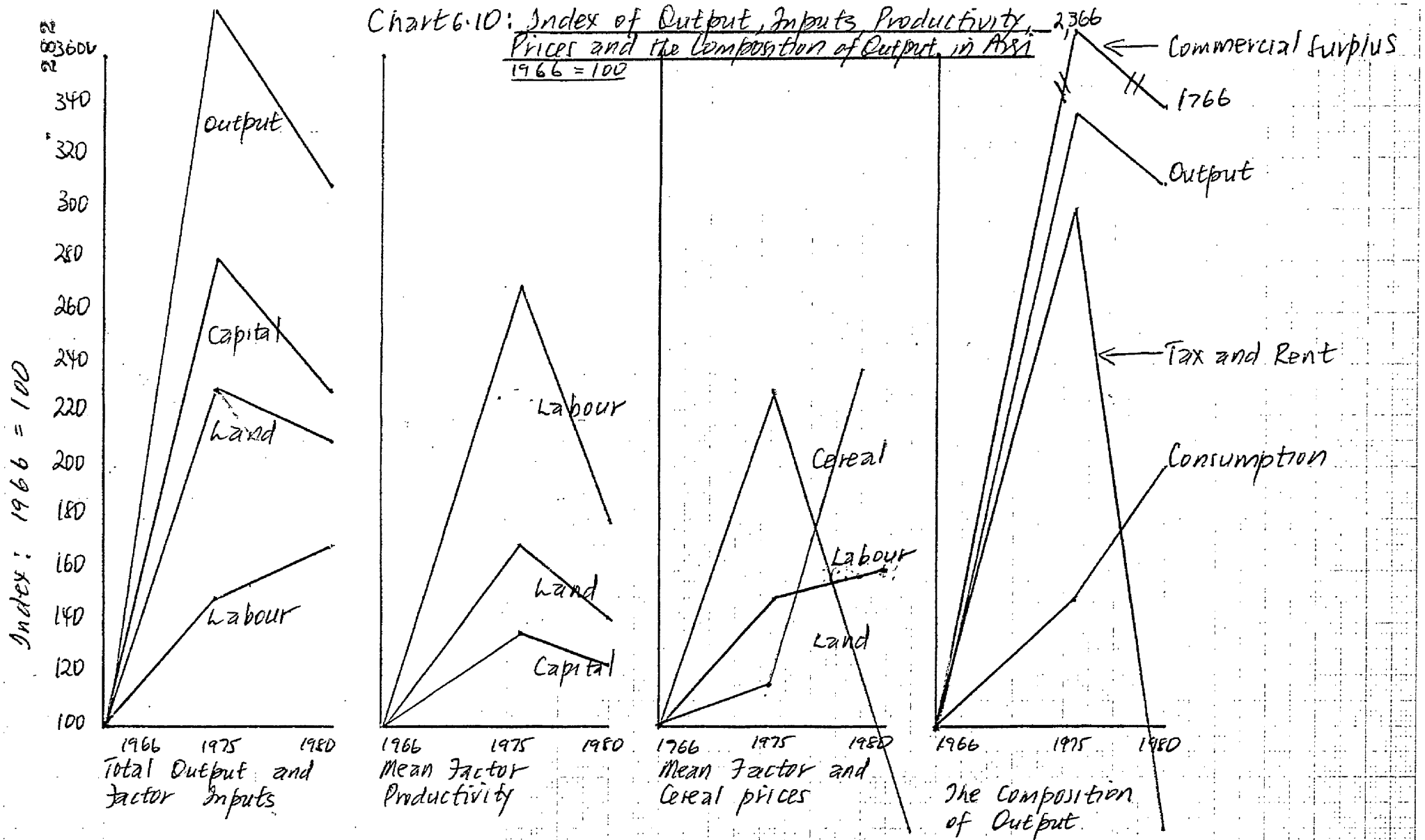
Source: Tables 6·17, 6·39, 6·40

Chart 6.9: Chilalo, Arbagugul Ticho-Crop Production in Birr at 1971 prices in 1966, 1975 and 1980



Source: Table 6.15, 6.16

Chart 6.10: Index of Output, Inputs Productivity, Prices and the Composition of Output in Abs
1966 = 100



Source: Table 6.15, 6.16

4.7 CONCLUSION

The introduction of the new technology inputs in Arsi after 1967, its widespread adoption and the increasing land and labour productivity (under the then prevailing relative prices with neither subsidized nor supported prices apart from the 'development cost'), hastened the ongoing peasantization from semi-nomadism, set a trend towards the social differentiation of the peasantry and laid the technological basis for the emergence of agrarian capitalists. The increased demand for land, the rise in the level of share cropping tenancy and a change in the relation of production towards 'contract' farming made share cropping tenancy more onerous and in other cases led to the eviction of tenants and their replacement by hired labour. The cost advantage in land rent, the return to scale for management and the social position of the mechanized farmers made mechanization more profitable along with the supposedly 'scale neutral' component of the new technology. On the other hand, the rapid rise accounted for mainly by increased land under cultivation in single cropping rainfed agriculture, hitherto used extensively for grazing, limited the scope and frequency for interhousehold, intervillage and intersubregional labour absorption, especially in harvesting.

The high rate of profit, capital accumulation (from a low base) in the form of agricultural machinery and working capital (seed, fertilizer and fuel) by the mechanized farmers, and the accompanying high labour productivity were in the process of changing the forces and relations of production in Arsi agriculture. With the increasing

ascendancy of rich peasants hiring in labour, utilizing machinery and services, using new seed and fertilizer for wheat, and the increasing productivity of land with size, the income differentials and the trend towards the social differentiation between the peasant strata increased. On the other hand, the higher regional ratio of the gross marketed output, the net marketed output and the commercial surplus laid the basis for a new agrarian structure including proto-capitalist mechanized farmers with increased intersectoral demand and supply relations, so widening the possibilities for accumulation in agriculture and non-agriculture.

The radical redistributivist agrarian reform reversed this process, and set in motion a new process towards middle peasantization. It has, however, in the process worsened the income position of the poor peasants absolutely and in relation to the post-reform economically dominant middle peasants. This and the associated new tax policy, the increase in the production of subsistence crops within an overall reduced level of output (both because of acreage, lower land productivity in the change to subsistence crops and the lowering of the holding size), the fall in the marketed surplus, the improved price terms of trade in favour of agriculture (both in relation to inputs and non-agricultural consumption goods) constitute a fundamental problem for accumulation and equity.

This is further problematized at the national level in chapter seven. A universalized development strategy premised on the inverse relation between land productivity and farm size on the one hand and statistically conceived factor proportions on the other, without reference to a dynamic class analysis promises neither equity nor the basis of an agrarian structure for rapid accumulation and development.

APPENDIX 6.

Table A.6.1

Percentage of Status of Tenure by Peasant Stratum in Arsi in 1966.

SL NO	Peasant Stratum	Owned	Partly Owned	Rented	Total
1	2	3	4	5	6
1	PP	16	-	13	29
2	LMP	21	3	25	49
3	UMP	4	3	9	16
4	(MP)	(25)	(6)	(34)	(65)
5	RP	2	1	2	5
6	TOTAL	43	6	61	99

Source: IEG, CSO A Survey of Arsi Province, Addis Abeba 1967 p.17-20.

Table A.6.2 The Dynamics of Land Use in the CADU Project Area between 1969 & 1970

a) By Cropping Season

SRL No.	Land Use	Percentage 1969			Percentage increasing in 1970			Percentage constant in 1970			Percentage decreasing in 1970			Balance (6-12) (7-13), (8-14)		
														(6-12)	(7-13)	(8-14)
		LO	Te	T	LO	Te	T	LO	Te	T	LO	Te	T	LO	Te	T
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	% of peasants with															
1	Land owned	100	-	57	4	-	3	96	-	54	-	-	-	+4	-	3
2	Land rented in	59.4	100	77	13	42	25	80	41	63	12	18	15	+1	+24	+10
3	Land rented out	36.0	-	21	17	-	10	58	-	33	17	-	17	0	-	-7
4	Grazing land	95.4	73	86	11	12	11	50	75	61	38	14	25	-27	-2	-17
5	Cultivated land	100.0	100	100	48	44	46	28	29	29	23	27	+25	+25	+17	+21
6	Land under wheat	85	57	73	54	64	58	18	16	17	18	21	19	+36	+43	+39
7	Land under barley	96	94	95	34	35	35	28	23	26	37	43	40	-3	-8	-5

LO = owner Te = tenant T = total

b) By Status of Tenure

SRL No.	Land Use & Status	Land Owners: Change in 1970					Tenant: Change in 1970					Total: Change in 1970				
		% 1969	+%	K%	-%	Bal (4-6)	% 1969	+%	K%	-%	Bal% (9-11)	% 1969	+%	K%	-%	Bal% (14-16)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	% of peasants with															
1	Land owned	100	4	96	-	+4	-	-	-	-	-	57	3	54	-	+3
2	Land rented in	59	13	80	12	+1	100	42	41	18	+24	77	25	63	15	+10
3	Land rented out	36	17	58	17	0	-	-	-	-	-	21	10	33	17	-7
4	Grazing land	95	11	50	38	-27	73	12	75	14	-2	86	11	61	28	-17
5	Cultivated land	100	48	28	23	+25	100	44	29	27	+17	100	46	29	25	+21
6	Land under wheat	85	54	18	18	+36	58	64	16	21	+43	73	58	17	19	+39
7	Land under barley	96	34	28	37	-3	94	35	23	43	-8	95	35	26	40	-5

+% = increased K% = constant -% = decreased balance = (4-6, 9-11, 14-16)

Source: Computed from CADU, CADU Agricultural Survey 1971 (Baseline Study for Evaluation of the impact of the project), CADU Publication No.71, Assela, July 1971, pp.11,13,14,16.

Table A.6.3 · Growth Rates of Value of Output, Hectarage, Derived Percentage Share of Growth in Yield and Hectarage in Arsi in 1966-1980

SL No.	Crop	1966-1975					1975-1980					1966-1980				
		% of Growth			% Share		% of Growth			% Share		% of Growth			% Share	
		Total	Ha	Yield	Yield	Ha	Total	Ha	Yield	Yield	Ha	Total	Ha	Yield	Yield	Ha
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Wheat	27	15	12	43	57	-14	-11	-3	-24	-76	8	10	2	19	81
2	Barley	9	4	5	49	51	4	1	3	75	25	7	3	3	48	52
3	Teff	19	9	12	65	35	21	13	8	37	63	12	9	4	29	71
4	Maize	22	13	9	40	60	4	30	1	30	70	13	10	4	28	72
5	Sorghum	46	40	6	13	87	7	3	4	65	35	8	26	18	-109	100
6	Cereals	19	12	7	35	65	-3	-2	-1	-15	-85	9	7	3	27	73
7	Others	10	4	6	61	39	3	1	2	64	36	7	3	4	61	39
8	Total	18	9	9	52	48	-2	-2	0	0	100	8	6	2	25	75
9	Peasant Sector	17	10	7	39	61	-0	-1	-1	100	0	9	6	3	35	65
10	Non-Peasant Sector	45	40	5	9	91	-32	-27	-5	-14	-86	8	21	-14	-180	100

Source: Derived from Tables 6.3-6.4, 6.11, 6.15-6.17

Table A.6.4 Estimated Area Under Annual Crops (000 Ha) for Ethiopia and Arsi 1966 and 1974/5

SL NO	Crops	1966			1974/75			Growth Rate 1966-1974/5	
		Ethiopia	Arsi Ha	%	Ethiopia	Arsi Ha	%	Ethiopia	Arsi
1	2	3	4	5	6	7	8	9	10
1	Major Crops	3,558	217	6.1	5,379	523	9.7	4.2	9.2
2	Cereals	2,999	172	5.7	4,450	446	10.0	4.0	12.1
3	Wheat	374	48	12.8	765	201	26.3	7.4	15.3
4	Barley	689	98	14.2	762	155	20.3	1.0	4.6
5	Maize	432	13	3.0	749	45	6.0	5.6	13.3
6	Millet	110	-	-	205	-			
7	Sorghum	471	0.5	-	751	20	2.7		39.6

For Source see the next page

1. There is a considerable discrepancy in area under crops by different sources, IBRD 1973; CSO 1966, 1971 and PMGSE. Data Book on Land Use and Agriculture of Ethiopia 1982. We have selected the latest adjustments to earlier periods 1966-1974/75 in PMGSE Area, Prod. 1980. Arsi's estimation appears to be reasonably correct as cross-checked between CADU/ARDU, CSO and Ministry of Agriculture Surveys.

Table A.6.5 Estimated Area under Annual Crops (000 Ha) for Ethiopia & Arsi 1974/75 & 1980

SL No.	Crops	1974/75			1979/80			Rate of Growth			
		Ethiopia	Arsi		Ethiopia	Arsi		75/80		66/80	
			Ha	%		Ha	%	Ethiopia	Arsi	Ethiopia	Arsi
1	2	3	4	5	6	7	8	9	10	11	12
1	Major Crops	5,379	523	9.7	5,418	497	9.2	0.1	-1.0	2.8	4.6
2	Cereals	4,450	446	10.0	4,615	425	9.2	0.7	-1.0	2.9	6.2
3	Wheat	765	201	26.3	511	116	31.9	-7.8	-10.8	2.1	10.0
4	Barley	762	155	20.3	837	164	19.6	1.9	1.0	-1.3	3.4
5	Maize	749	45	6.0	910	51	4.8	4.0	2.5	5.1	9.6
6	Millet	205	-	-	238	-	-	-			
7	Sorghum	751	20	2.7	726	25	3.4	-1.0	-2.1	3.7	6.2

Source: PMGSE, Data Book on Land Use & Agriculture in Ethiopia; Vol.1, Addis Abeba, Oct. 1982 pp.4, 20, 21, 29, 32; PMGSE Area, Production & Field of Major Crops for the Whole Country & Region, Addis Abeba, July 1982, p.22 and Tables 4.7, 4.11 & 4.12 for Arsi; CSO A Survey of Arussi Province, 1966, p.17-19; ARDU 18, 1981, pp.25-26

Table A.6.6 Value of Output of Major Crops in Ethiopia and Arsi in 1966-1980 in Mill. of Ethiopian Birr at 1971 Prices

SL No.	Crops	1966			1974/75			1980			Growth Rate Percentage					
		Eth.	Arsi	%	Eth.	Arsi	%	Eth.	Arsi	%	66/75		75/80		66-80	
											Eth.	Arsi	Eth.	Arsi	Eth.	Arsi
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Cereals	520	31	5.9	715	121	16.9	754	107	14.1	3.1	18.6	0.9	-2.6	2.7	9.3
2	Wheat	67	10	14.9	146	66	45.2	93	31	33.3	10.2	26.8	7.3	-14.2	2.1	8.4
3	Barley	83	15	18.0	82	30	36.6	93	37	39.7	-0.2	9.1	2.1	4.0	0.8	6.6
4	Maize	88	3	3.4	151	16	10.5	168	19	11.3	7.0	22.0	17.2	3.6	4.7	13.4
5	Teff	212	3	0.9	229	5	2.2	285	14	4.9	1.0	18.9	4.3	21.3	2.1	12.4
6	Sorghum	70	-	1.4	107	4	3.7	115	6	5.2	5.4	45.0	1.2	7.2	3.6	7.9

Source: PMGSE, Data Book on Land Use & Agriculture in Ethiopia, Vol.1, Addis Abeba, October 1982, pp.4, 20, 21, 29, 32; PMGSE, Area Production and Yield of Major Crops for the Whole of Country and by Region, Addis Abeba, July 1982, pp.22 & Tables 4.6, 4.10 & 4.11

Table A.6.7 . Size Distribution of Holdings at Different Levels of the Adoption of the New Technology in Chilalo in 1966-1972

SL No.	Holding Size	Percentage of Households						Percentage of Acreage in Ha					
		Chilalo 1966	Chilalo 1971	Etheya 1972	Area North 1970	Area South 1969	Bekoji 1969	Chilalo 1966	Chilalo 1971	Etheya 1972	Area North 1970	Area South 1969	Bekoji 1969
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0-1	16	12.7	3.1	5.7	2.6	5.5	1.2	1.7	0.5	1.2	0.4	3.2
2	1-3	53	45.7	28.6	24.3	32.2	56.1	42.6	21.2	23.2	17.6	18.1	41.8
3	3-5	25	13.6	37.5	37.1	37.3	32.8	44.1	12.1	38.5	48.9	38.7	35.7
4	(1-5)	(78)	(59.3)	(66.1)	(61.4)	(69.5)	(88.9)	(86.7)	(33.3)	(61.7)	(66.5)	(56.8)	(77.5)
5	5-10	6	28.0	20.8	14.2	25.3	5.5	12.0	57.6	37.8	32.3	42.9	17.9
6	10				18.6	2.7			7.4				1.3
7	Total	100	100	100 (96)	99.9 (70)	100 (73)	100 (73)	100 (208.50)	100 (271,048)	100 (353.3)	100 (207)	100 (279.5)	99.9

( ) Size of Samples ( ) Hectares

Source: Computed from IEG, CSO, A Survey of Arussi Province, Addis Abeba, 1966, pp. 17-19; Results of the National Sample Survey: Second Round, Vol.V; Land and Area Utilization, Addis Abeba, Feb. 1975, Stat. Bulletin No.10, pp.17-23; Holmberg, Johan, Survey of Consumption Pattern in the Etheya Extension Area, Oct. 1973, pp.30; CADU, Evaluation Studies: General Agricultural Survey, CADU 71, Assela, 1971.

Table A.6. 8. Percentage Growth Rate of Number of Households and Area under Cultivation in Arsi in 1966-1974 by Peasant Stratum.

SL NO	Peasant Stratum	Households		Area Cultivated		Net Per Capita (6-4) % of gr.. Ha
		No	%	Ha	%	
1	2	3	4	5	6	7
1	Landless	+9,100	+7.3			
2	PP	+3,364	+1.9	+16,260	+6.3	+4.5
3	LMP	+14,102	+5.0	+16,030	+3.0	-2.0
4	UMP	-10,332	-10.6	-27,363	-8.3	-2.3
5	MP	(+3,770)	(+1.0)	(-11,333)	(-1.4)	(-2.4)
6	RP	+20.339	+139.0	+178,035	+150.3	+11.0
7	CF	NA	-	+ 17,983	+158.2	+158.1
8	TOTAL	+36,900	+4.9	190,945	13.1	+8.2

Source: IEG, CSO A Survey of Arsi Province, Addis Abeba 1966 pp. 17-19 and IEG, CSO Results of the National Sample Survey: Second Round: Vol. V Land and Area Utilization Addis Abeba, Feb. 1975 Stat. Bull. No. 10 pp. 17-23.

Table A 6.9 The Availability for Agricultural Work (%) by Sex and Age and Type of Tasks in Chilalo in 1975.

SL NO	Agricultural Task	Adult Men	Adult Women	Children
1	2	3	4	5
1	Ploughing	96	7	7
2	Sowing	93	5	3
3	Weeding	96	81	17
4	Harvesting	96	34	8
5	Threshing	95	5	12
6	Winnowing	94	27	7

Source: Gills G. Seasonal Employment and Technological Change on Small Holding in Chilalo. Ethiopia Ph.D. Thesis University of Strathclyde, 1978, pp.97-98

Table A.6.10 Increase in Price and Ratio of Khaki and Cereal Prices in Selected Market Centres in Ethiopia in 1975-1979

SL No.	Market Centre	Rate of Price Increase (%)				Khaki/Cereal Ratio	Cereal
		Teff	Sorghum	Wheat	Khaki		
1	2	3	4	5	6	7	8
1	Dilla	14.3	24.8	32.7	13.9	0.97	Teff
2	Ghumbi	18.7	5.7	24.0	15.5	0.82	Teff
3	Kobo	9.2	1.7	34.5	3.9	0.71	Teff/Sorghum
4	Assela	13.0	-	15.1	45.0	2.98	Wheat
5	Shashemene	8.8	18.4	21.5	11.3	0.70	All three
6	Awassa	8.7	-	0.5	1.9	0.21	Teff
7	Debre Markos	8.3	4.6	-	16.7	2.01	Teff
8	Gonder	21.0	43.2	34.0	27.3	1.0	Teff/Wheat
9	Harer	-	1.1	22.3	10.0	9.1	Sorghum
10	Jimma	-	27.2	76.0	10.3	0.38	Sorghum
11	Mekelle	-	37.9	-	13.7	0.36	Sorghum
12	Metu	19.0	-	-	6.9	0.36	Teff
13	Nekemt	8.2	13.3	-	1.1	0.13	Teff
14	Addis Abeba	22.8	26.6	27.0	14.2	0.56	All three

Source: Compiled from Shifferaw Gurmu, "An Empirical Analysis of Price Trends in Ethiopia" Ethiopian Journal of Development Research, Vol.14, No.2, 1980. p.33.

CHAPTER FIVE

5.1 INTRODUCTION

In the discussion of the agrarian structure in Ethiopia in chapter four, we argued that due to the articulation of the tributary and capitalist modes in agriculture at the level of exchange, the home market may well have been less than 5% of the gross national product. Over half of the marketable output was obligatory and a large portion of it "distress" surplus due to absentee and resident proto-landlords with high marginal propensity to consume imported goods and investment in urban buildings rather than accumulation in agriculture. We tried to demonstrate the changing basis of the forces and relations of production with respect to Arsi agriculture with the introduction of the new technology inputs in 1967, in Chapter Six. Since 1970, the CADU/ARDU innovation dissemination strategies have been extended into all parts of Ethiopia accessible by road transport. Unlike CADU/ARDU, however, the Extension Project Implementation Department (EPID) minimum package projects (MPPS) consisted only of activities "...considered most essential for small farmer development namely agricultural extension work and the sale of inputs in credit in order to bring the benefits of development to a large number of people at minimum cost by employing the methods and innovations developed and tested in the comprehensive package projects" (EPID No. 13: 1971 p.1).

In this chapter, we examine the process of the social differentiation (1970-1975) and peasantization (1975-1980) in Ethiopian agriculture as a whole, and then the intersection of these with state intervention in cereal marketing and the impact upon the marketable

surplus, terms of trade, accumulation within and outside of agriculture and the distribution of incomes among the different strata of the peasantry.

Section two presents the type and amount of the new technology inputs and the levels of agricultural output in pre (1970-1975) and post (1975-1980) agrarian reform periods according to official statistics. Section three examines the pattern of peasant differentiation and its implications for the marketed surplus in 1970-1980. The last section integrates the analysis in the preceding sections by assessing the changes in agricultural output, in its distribution among peasant strata and their impact on prices, agriculture's terms of trade with its purchased inputs and consumption goods. The implications for accumulation and structural change in the economy as a whole are considered.

5.2 THE NEW TECHNOLOGY INPUTS & THE LEVELS OF AGRICULTURAL OUTPUT IN 1970 & 1975-1980

Table 7.1 Consumption of Fertilizer, Number of Users and Indices in Ethiopia in 1970-1980/81

No	Year	Households		Fertilizer		Qtl/HH
		No	Index	Qtls	Index	
1	2	3	4	5	6	7
1	1970/71	51,415	100	82,610	58	1.6
2	1971/72	65.107	126	101,530	72	1.6
3	1972/73	75,295	146	226,290	160	3.0
4	1973/74	38,727	75	178,890	126	4.6
5	1974/75	51,513	100	141,000	100	2.7
6	1975/76	90,241	175	103,000	73	1.1
7	1976/77	204.130	396	289,000	205	1.4
8	1977/78	245,315	476	332,000	235	1.3
9	1978/79	229,677	446	351,000	249	1.5
10	1979/80	372,220	722	441,000	313	1.2
11	1980/81	350,104	680	(113,000) 420,000	298	1.2

( ) State Farms

Source: For 70/71-1973/74 Second Minimum Package Projects Preparation Document Annex I Table 2.
For 1974/75-1980/81 Ethiopia: Review of Farmers' Incentives and Agricultural Marketing and Distribution Efficiency, Joint Govt. of Eth/World Bank Mission, March 1983. Annex 2 Table III 16 p. 92.

Table 7.2 Ethiopia: Distribution of Fertilizer by Size of Holdings in 71/72, 73/74 and 74/75.

No.	Size Distrib. of Cultivated Land in Ha	% of Total HH in 74/75	% of the Share of fertilizer		
			71/72	73/74	74/75
1	2	3	4	5	6
1	0-1	50	1	1	5
2	1-3	32	12	30	22
3	3-5	12	14	58	31
4	(1-5)	(44)	(26)	(88)	(53)
5	5	6	71	11	42
6	Total	100	98	100	100

Source: For Col. 3 PMGSE Data Book on Land Use and Agriculture Vol. II, Addis Ababa, 1982, p. 258. Col. 4 & 5 EPID, EPID Annual Report '73/'74, EPID No. 24 p. 12; Col. 6 EPID. No. 33 Annex 3 p.6

HH = Household

The imports/consumption of fertilizer increased rapidly from a low base in the late sixties and accelerated in the post MPP period as shown in table 1. Between the onset of the agrarian reform of 1975 and 1980, the number of participating peasant households in the adoption of fertilizer increased by nearly seven times while that of their consumption of fertilizer did so threefold, indicating a decline in per capita consumption with the redistribution of holdings and possible more participation by the hitherto tenanted peasantry. Together with state farms, the level of fertilizer use increased nearly five times from 1974. Virtually unknown in Ethiopian peasant agriculture prior to 1967, fertilizer use increased at a compound growth rate of 22.2% per annum in 1974/75 - 1980/81.

As in Arsi, most of the new technology input was consumed by upper middle and rich peasants (Table 7.2). Considerably less than fertilizer, the use of improved seed also increased nearly three times in 1978/79 and 1982/83 (Appendix 7.2). The cropped area with artificial fertilizer increased from a mere 3% in 1974/75 to 10% of the area under cereals in 1980.[1]

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1. This is assuming the use of the recommended 1 quintal of fertilizer on a hectare of land. The area, however, could be higher as most farmers used less than a quintal (1/2- 3/4) of fertilizer per hectare in Arsi (Bengston Bo: 1984, p.5). With 3/4 quintal of fertilizer per hectare, the area under fertilizer use in cereals may have increased to 12% of the land allotted to cereal production.

The post agrarian reform period's somewhat reliable component of trend in output, area, shows a rapid increase in acreage in the first four years and very sluggish ones in the subsequent years.[2]

Considering the fact that over 95% of the total cultivated land was held by peasant households, with the redistributive agrarian reform, the total area under crops remained at similar levels in the post reform period increasing at an annual compound rate of only 1.1% (Table 7.3). Of the major cereals, the mainly urban destined wheat was the only one with a negative growth rate of hectarage - 9.6% per annum. For cereals as a whole, the combined area and yield increase of nearly 3.1% was above the rate of population growth (2.7%). About two-thirds of the increase in output is accounted for by yields.[3] We present below the area, yield and output increase in 1974/75 — 1979/80 and a graphical presentation of output, acreage and yield in the same period.

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2. This may be , because of inaccuracies of the first two survey data (1966-1968, 1971) rather than actual trends, although the increasing process of commercialization, evidenced from the increase in the number of tractors, su bsidized fuel (Appendix 7.1) suggest possible increase in acreage in the non-peasant sector. Its overall national impact, however, is unlikely to be as high. Given the high variability of output in this period, we have chosen to disregard the pre reform period acreage and output data concentrating on the 74/75 - 79/80 annual surveys.

3. There is a considerable discrepancy in the measurement of output increase in yields, and acreage in the post reform period. Thus Saith '85 reports, 16% annual increase in output in the post reform period mainly accounted for by yield, while Griffin '85 reports general decline in yield level and a less than population growth rate of output of agriculture and more of the growth as having been accounted for by area increase. Assuming a random variation in weather conditions, we see no ground for a fall in acreage and yield. The incremental yield of 4 qtls of cereals covering at least the financial cost and risk premium for peasant households, the estimated

See p.410

Table 7.3 Ethiopia Area, Yield and Production of Main Cereals in 1974/5-1979/80.

a) Area in "000" Ha

sl no	Cereals	1974/5	1975/6	1976/7	1977/8	1978/9	1979/80
1	2	3	4	5	6	7	8
1	All Cereals	4,450	4,411	4,215	4,339	4,615	4,800
2	Teff	1,218	1,440	1,337	1,304	1,393	1,450
3	Barley	1,440	545	711	798	837	874
4	Wheat	1,337	537	548	493	511	533
5	Maize	749	733	673	849	910	946
6	Sorghum	751	778	747	763	726	758

b) Yield in qtls/Hectare

1	2	3	4	5	6	7	8
1	All Cereals	8.5	10.6	10.4	9.2	8.8	6.2
2	Teff	6.9	7.0	7.4	7.8	7.8	6.8
3	Barley	8.2	10.1	12.5	8.6	8.3	6.7
4	Wheat	9.1	9.1	11.0	9.1	8.8	7.4
5	Maize	11.2	18.7	14.1	11.6	10.8	8.9
6	Sorghum	8.4	11.2	10.1	9.3	9.4	7.2

c) Production in "000" tons

1	2	3	4	5	6	7	8
1	All Cereals	3,800	4,698	4,371	3,985	4,080	3,940
2	Teff	847	1,004	994	1,022	1,084	993
3	Barley	625	537	895	690	697	583
4	Wheat	699	532	605	429	449	394
5	Maize	841	1,370	948	929	982	847
6	Sorghum	630	875	756	708	680	548

Source: 1974/75-1978/79; PMGSE Area, Yield and Production of Major Crops for the Whole Country and By Region. Addis Ababa, July 1980:
1979/80: Govt. of Ethiopia/World Bank: Review of Farmers' Incentives and Agricultural Marketing and Distribution Efficiency, 1983, p. 7.
Griffin: 1985: p. 40.

Table 7.4 Ethiopia: Estimates of Rates of Growth of Cereal Outputs in 1974/75-1979/80

Cereals	Area	Yield	Total
1	2	3	4
All Cereals	1.1	2.0	3.1
Teff	3.4	2.7	6.1
Barley	3.6	0.3	3.9
Wheat	-9.6	-0.9	-10.5
Maize	5.0	-0.9	4.1
Sorghum	0.5	2.8	3.3

Source: Solomon et al. Evaluation of the Arsi Regional Development Unit, June/July 1981. 1970/71-1973/74
PMGSE: Area, Production and Yield and Major Crops for the whole country and by Region in 1974/75-1978/79, Addis Ababa July 1980 p. 33
GOE/IBRD: Ethiopia: Review of Farmers' Incentives and Agricultural Marketing and Distribution Efficiency, March 1983, Annex 2 Table III 16, p.92

3. cont.
420,000 quintals of fertilizer in 1981 would have increased output by 170,000 tons (5% of total output). The countrywide quantity of agricultural output in Ethiopia is at best a rough estimate. The diversity of the ecological zones, ranging from lands below sea level to the ice capped Mount Dashen, the problem of transport and communication, the security situation in some parts, coupled with the variability of output in rainfed subsistence agriculture, are bound to compound possible inaccuracies in measurement.

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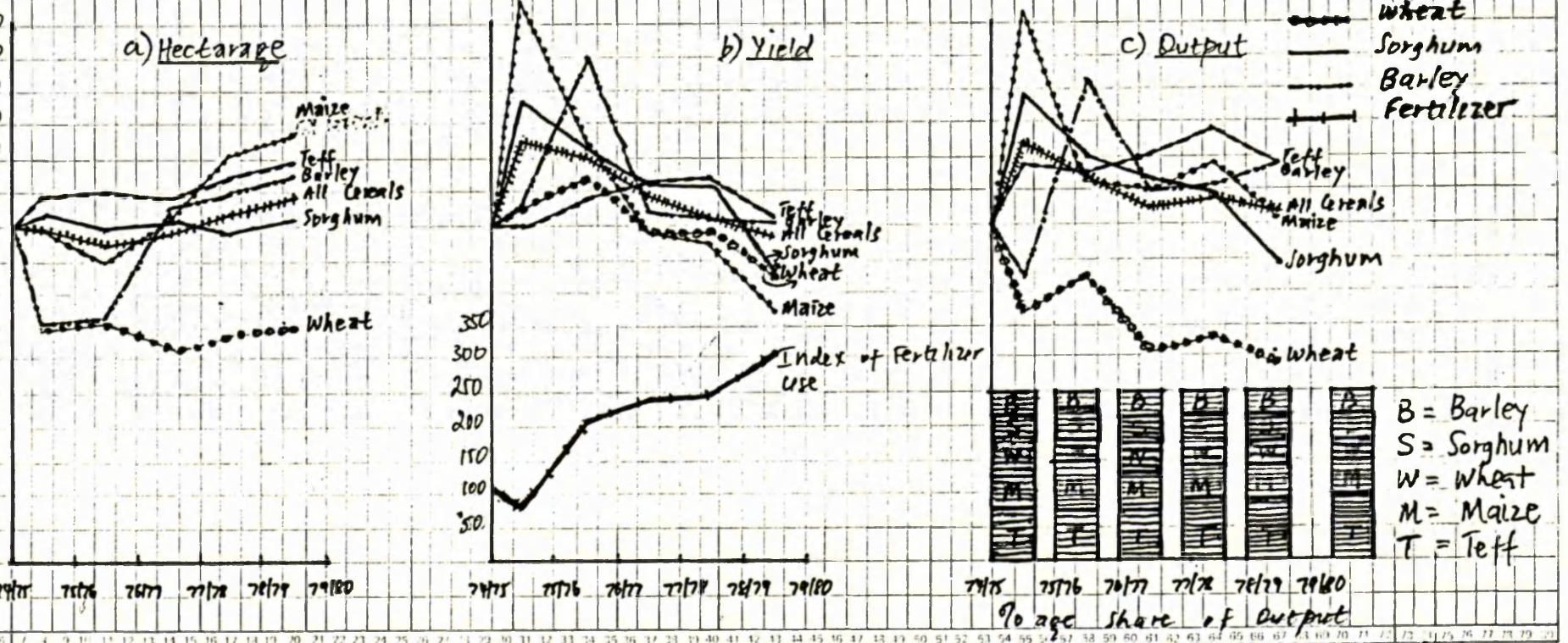
Chart 7.1 INDEX OF THE HECTARAGE, YIELD AND OUTPUT OF THE MAJOR CEREALS IN ETHIOPIA IN 1974/75 - 1979/80
1974/75 = 100



Source: PMGSE · Area, Production and Yield of Major Crops (UK) 1980, pp 32-41; PMGSE/IWB, 1983, p.7.

The attached chart of area under cereals, yield and output depicts more clearly the sluggish but upward trend in area under cereals, except the distinct decline for wheat. On the other hand, contrary to expectations, with the countrywide increased level of fertilizer use, wheat and maize showed a decline in yield in later years. Within the overall increasing yield levels for the period as a whole, the fall for wheat and maize may be accounted for more by the redistribution of holdings to subsistence producers, as wheat is a commercial crop of rich peasants and proto-capitalist farmers.

Within the modest levels of output increase estimated by the survey result, the level of the urban destined breakfast food par excellence, wheat, drastically decreased, in contrast with the increase in the high valued cereal, teff.[4] However, with a fall in its output, the price of wheat in relation to teff decreased, suggesting a relative decline in its demand,[5] while that of the other 'coarse' cereals increased, as we shall see in section five.

A regional analysis of the area under cultivation and change in the level of output indicates that regions with higher levels of differentiation of the peasantry and levels of tenancy showed a noticeable decrease in the area under cultivation in the post reform period. (PMGSE: 1980, pp59-72). Two such provinces, Shoa and Arsi, had their national share of the cultivated land decline

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4. The implications of this new cropping pattern, of absolute and relative prices, and the marketed surplus under the new agrarian structure for income distribution, welfare and accumulation are discussed more fully in section five.

5. This is consistent with the fall in real wages among workers and urban low income groups leading to a substitution towards the coarse cereals. See Smith: 1985.

from 35.9% in 1974/75 to 33.3% (mean of 75/76 - 78/79). (PMGSE: 1980). This is a reflection of the decline of holdings by the hitherto commercial farmers and rich peasants, and their redistribution to middle peasants as we shall see in Section III. The relatively 'land surplus' regions of Wollega and Keffa increased their level of cropland together with their consumption of fertilizer, which tallies well with the national increase in the area under teff. Perhaps as a continuation of the past trend, a number of regions with higher per household cultivated land also registered higher yield per hectare (Appendix 7.Table 4), suggesting a positive relation between net sown area and land productivity - confirming at a macro level what the analysis of Chilalo peasant farms suggests (See chapters five and six). Arsi, where the new technology was introduced first, had the least cropland fallow ratio (most extensive use of land), also had the highest per capita consumption of fertilizer, the second highest holding per household, the second highest yield per hectare, and the highest cereal output per capita (Appendix 7 Table 4).

Extending the farm size land productivity analysis, based on our suggested identification of the three agrarian systems in Highland Ethiopia in chapter four, we compared the ratio of aggregate output, cultivated land and labour (assuming total rural population with equal household sizes as a proxy) with the following results. Agrarian system three shows not only high labour productivity due to the higher cultivated land labour ratio but also high land productivity as well. Agrarian system two with the highest labour land ratio has a slightly lower land productivity than agrarian system one.

Table 7.5 Ethiopia: Comparative Labour and Land Productivity in the Three Agrarian Systems in 1980.

SL NO	AGS	HH NO in 000	Area '000 Ha	Prod '000 tons	Lab/ Land Ratio	Output/ Lab. Ratio	Output/ Land Ratio	X Lab Prod (5÷3).100	X Land Prod-col. (5÷4).100
1	2	3	4	5	6	7	8	9	10
1	AGS1	1,304	1,840	1,356	0.71	1.04	0.74	77	81
2	AGS2	1,003[6]	1,243[6]	904[6]	0.81	0.90[7]	0.73	67	80
3	AGS3	1,037	1,840	2,206	0.56	2.13[7]	1.23	158	135
4	Total	3,344	4,972	4,520	0.67	1.35	0.91	100	100

Source: Cultivated Land: Griffin; 1985 p.45 Household No: PMGSE Census of Ethiopia, 1985. Cereals: PMGSE: 1982 pp.1-23: GOE/WG: 1983 p. 92
AGS=Agrarian System - See chapter four section 3

These wide variations in land and labour productivities, supplemented by microlevel cost benefit analysis of accumulation in infrastructure and macroeconomic planning at the national level in agrarian systems, suggest several considerations. In the realm of taxation, poor peasants in AGS 2 would find it easier to provide labour instead of cash as both land and labour productivity are very low. Land augmenting investment, resettlement (from the first two to the third) and the introduction of labour intensive investment in systems 1 and 2.

6. Taking 2/3 of Kembatta, 50% of Haiqoch and Butajira, 50% of Chebo and Gurage all sedentary Sidamo, Harerge, Gamu Goffa and the awadjas of Mocha in Illubabor and Keffa in Keffa Region. The rest of the ratio of the above in Shoa are aggregated with Shoa South (AGS 3).

7. The actual land and labour productivity in agrarian system three and to some extent two are underestimated due to the non-inclusion of coffee while we have assumed a constant 200,000 tons of enset cereal equivalent in the latter.

This is all the more so if the peasant sector were to continue as the largest sector in the transition to cooperative and collective farms, which at the present are at very low levels, as shown in the following tables.

Table 7.6 Ethiopia: The Relative Share of Peasant, Cooperative and State Farm in the Output of Cereals in 1975/76 - 1978/79

A) Hectarage '000 Ha

Year	Peasants		Cooperative		State Farms		Total	
	Ha	%	Ha	%	Ha	%	Ha	%
75/76	4,619	98.3	46	0.8	18	0.58	4,698	100
76/77	4,282	98.0	34	0.5	26	0.60	4,369	100
77/78	3,888	97.5	33	0.7	24	0.6	3,986	100
78/79	3,966	97.2	36	0.7	33	0.8	4,080	100

B) Output '000 tons

Year	Peasants		Cooperative		State Farms[8]		Total	
	Ha	%	Ha	%	Ha	%	Ha	%
75/76	4,619	98.3	38	0.8	41	0.9	4,698	100
76/77	4,282	98.0	24	0.5	63	1.5	4,371	100
77/78	3,887	97.5	27	0.7	71	1.8	3,985	100
78/79	3,966	97.2	29	0.7	85	2.1	4,080	100

Source: PMGSE. Area, Yield and Production of Major Crops by Region for the Whole Country, AA 1979 pp 12, 17, 21, 24, 27-28.

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8. Due to their inefficient use of farm machinery and low labour and land productivity in relation to inputs, although they meet the strategic need for augmenting the supply of food to the urban population; it is reported that (Saith: 1985) 80% of the state farms had a negative contribution to agricultural output in 1980.

5.3 THE PATTERN OF THE SOCIAL DIFFERENTIATION OF THE ETHIOPIAN PEASANTRY 1966-1980

Due to the tributary nature of the relations of production and the attendant entitlement to inheritable plots, autonomy among the historical peasantry under agrarian systems 1 and 2, the relatively recent commercialization and high supply of land in the grain regions of agrarian system 3, we suggested oxen as the basis of social differentiation within the peasantry. We identified marginal peasants, the peasantry, local bureaucrats cum 'proto landlords' of the post 1941 state as the basic social classes in rural Ethiopia. We also indicated a tendency towards the differentiation of the peasantry in response to exchange in agricultural products set in motion by the forces of commercialization, centralization/functional differentiation of the state. The latter gave rise to an evolving separation of state functionaries (civil, military) and a change in the social relation of the peasantry and the dominant class via ownership of land and the payment of rent in cash and kind due to the proto landlords and the state. The functional differentiation to the state apparatus, the attendant process of urbanization, the establishment of light industries and the increasing incorporation of the petty bourgeoisie to man the 'modern' apparatus of the state (military, education, health, clerical and lower echelons of the bureaucracy) led to the making of new social classes - the urban proletariat, the salariat and the mercantile petty bourgeoisie.

Since 1951 but increasingly after the mid-sixties, however, the agrarian sector was undergoing fundamental changes encompassing new forces of production and class formation. In the irrigated plains of the Awash Valley, Dutch and later British foreign capital (HVA and Mitchell Cotts) and the local pastoral aristocracy undertook capitalist farming in the production of cotton as an import substitute for local textile industries and sugar agro industries.[9] By the mid sixties, mechanized cereal production employing seasonal labour for harvesting was undertaken by national urban and traditional elite.

In all cases, however, especially in the first two, being physically and temporally away from the centres of the labour supply in the Ethiopian Highlands on the one hand and the seasonal nature of labour demand, on the other, meant that the commercial farms depended on seasonal migrant labour. The plantation companies in the Awash Valley exploited peasant labour from the labour surplus highlands of agrarian system 1 and 2. (Bondestam: 1974; Mesfin: 1964). As will be set out under the extent of the marketed surplus by peasant stratum, these employments must have been important sources of meeting the food deficit and rent/tax obligation by the poor and lower middle peasantry if indeed these were the principal section of the peasantry who migrated in search of employment.

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9. Both were very highly exploitative ventures enjoying tax exemption paying below subsistence level of wages, high consumer prices for their products and huge repatriation of profits. Over 8 years, the average rate or return for HVA was estimated at 16.7% per annum of which over 50% was repatriated (Dumont: 1980, p.36).

A third and more important trend impinging on the internal differentiation of the peasantry was the introduction of the new technology inputs in peasant agriculture from the mid-1960s in Arsi, and later in Ethiopia as a whole in the post 1970 period.

In conjunction with the increasing use of the new inputs, a comparison of the results of sample surveys undertaken in 1966, 1969-1971 and1974/75 demonstrate, albeit at very aggregate terms, increasing polarization of the peasantry - an increase in the proportion and number of the marginal/poor peasants and the rich sections of the peasantry at the expense of the middle peasantry in agrarian systems 1 and 2 and of the proto-peasantry in the land surplus agrarian system 3. In the following table, we show the change in the percentage share of households and of holdings by peasant stratum between the introduction of the new technology inputs in 1970, the onset of the agrarian reform of 1975 and four years after the agrarian reform in 1978 (see Appendix Table 6 for the actual number).

Table 7.7 Change in the Size Distribution of Holdings and Acreage in Ethiopia in 1970, 1974 and 1978 '000

a) Holdings

Sl. No	Strata	No. of HH						Change in No. of HH			
		1970		1974		1978		1970-1974		1974-1978	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	2	3	4	5	6	7	8	9	10	11	12
2	LL	513	12.8	528	11.3	-	-	+15	+0.5	-0	-11.3
3	PP	2,164	54.1	2,064	44.3	2,095	51.1	-100	-9.8	+31	+6.8
4	LMP	951	23.8	1,307	28.1	1,450	35.4	+356	+4.3	+143	+7.3
5	UMP	220	5.5	515	11.1	497	12.1	+295	+5.6	-18	+1.0
6	MP	(1,171)	(29.3)	(1,822)	(39.2)	(1,947)	(47.5)	(+651)	(+9.9)	(+125)	(+8.3)
7	RP	154	3.8	239	5.1	57	1.4	85	+1.3	-182	-3.7
8	Total	4,002	100	4,653	99.9	4,099	100	651	0	0	0

b) Acreage in 000 Ha.

1	PP	985	20.3	1,408	18.4	1,158	18.5	+423	-1.9	-250	+0.1
2	LMP	1,571	32.4	2,472	32.3	1,712	27.4	+901	-0.1	-760	-4.9
3	UMP	785	16.2	1,531	20.0	2,863	45.8	+746	+3.8	+1332	+25.8
4	MP	(2,356)	(48.6)	(4,003)	(52.3)	(4,575)	(73.2)	(+1,647)	+3.7	(+572)	(+20.9)
5	RP	1,508	31.1	2,243	29.3	523	8.3	+735	-1.8	-1720	(-21.0)
6	Total	4,849	100	7,655	100	6,256	100	+2,806	0	+1399	0

Source: PMGSE, Results of the National Sample Survey: Second Round, Vol.V. Land and Area Utilization, AA, Feb. 1975. Stat. Bull. No.10, pp.17-23; PMGSE, Data Book on Land Use and Agriculture, Vol.I, AA, 1982, pp.258

The proportion of households without holdings in the country as a whole increased from 12.4% in 1966 to 12.8% in 1969-1971 and the number of rich peasants from 2.6% to 2.8%. In the same period, the number of middle peasants also increased slightly at the expense of the poor peasantry. Rather than the number of households, however, it is the concentration of holdings which brings out the increasing polarization of the peasantry. Holdings by the most numerous section of the peasantry, the poor peasants (accounting for 58.4% of the rural households), decreased from 25.6% to 20.3% and that of the lower middle peasants from 40.3% of the hectarage to only 32.4% in 1971. Although middle peasants' share of the number of households increased, their share of the acreage declined by 10.8% (from 53.5% in 1966 to 44.3% in 1971). The most dramatic increase, however, was the share of the rich peasant stratum from 20.5% of the holding area to 35.4%. Following the introduction of the new technology inputs in 1970 up to the onset of the agrarian reform of 1975, we see a continued further decline in the poor peasant stratum and a noticeable increase in the proportion of middle and rich peasants with a similar trend for the acreage as in 1969-1971. In 1966-1975 as a whole, both the tendency towards middle peasantization and polarization between the poor and rich peasantry were at work - a phenomenon made possible by the considerable increase in the area under cultivation and perhaps coupled by peasantization in the proto-peasant areas of agrarian system 3.

In the pre reform post new technology period, (1970-1975), the rich peasants with only 5.1% of the farming households had under their control nearly 1/3 of the

total area of the holdings. The poor peasants declined both in their percentage share of the households and area of holdings. The area held by both subsections of the middle peasants stabilized at nearly 50% of the total while the households increased from slightly over a quarter in 1966 to nearly 40% in 1975.

Following the agrarian reforms of 1975, the trend towards the social differentiation of the peasantry was reversed while the process of middle peasantization proceeded at an increasing pace. In 1978/79, nearly four years after the promulgation of the agrarian reform of 1975, all the previously largely marginal peasants estimated at 13.4% of the rural households held holdings (Dessallegn:1985; PMGSE:1982). The area held by the rich peasants declined from 29.3% of the total as also their number by four times from 5.1% of the total rural households in 1975 to only 1.4% in 1980. In view of the very slow growth of the area under cultivation (Table 7.3a) in 1980, the holdings held by the pre-1975 landless and poor peasants were a result of parcellation of the pre-existing holdings (Dessalegn Rahmato: 1985). At the onset of the agrarian reform, holdings of less than half an hectare made up 24.8% of the households and 6% of the area of holdings. In 1977/78, whereas their share of the households increased to 28.4%, the area declined to only 5.2% (PMGSE: 1982, p.256). The middle peasant stratum not only increased in its numerical share of the 1966, 1969-1971 and 1975 surveys from 24%, 29% and 37% to 48% in the post reform period, but more importantly as in Arsi it held 3/4 of all the cultivated land in 1978/79. Assuming similar levels of productivity, this stratum constitutes by

far the most strategically important section of the peasantry in its volume of output, the marketed surplus (as will be discussed more fully in the following section) response to innovations, and institutional, economic and political changes in the agrarian sector. They already figure prominently in the social profile of the post reform peasant leadership (Dessalegn: 1985).

The first national survey in 1966, the second in 1969-1971 and the third at the onset of the agrarian reform in 1974/75, clearly demonstrate a trend towards the pol arization of the peasantry, without however, the disintegration of the middle peasantry as the increasing holding of the poor peasantry and the bringing into cultivation of hitherto uncultivated lands. The post reform period reversed the process of proletarianization towards one of peasantization: with an increasing shift from marginal to poor peasants and from poor and rich to middle peasants in 1975-1980. This pattern of peasantization and the changed agrarian relations following the agrarian reform of 1975 have important implications for the level of the marketed surplus, type of cropping, the extent of the response of the agrarian sector towards innovation and changes in the institutional basis of agriculture; as well as for accumulation. This we will discuss in the next section.

Considering the general low levels of output and holdings, if the positive relations between land productivity and net sown area obtained for Chilalo in Chapter six were to be operative in other new technology using areas, as indeed demonstrated at the very macro agrarian system level, middle peasantization and remittance of rent could also have had the following results: a potential decrease in productivity and of the marketed surplus of cereals and a change in cropping towards domestically consumed crops, as we infer from

relative price changes and output between the main cereals in the next section.

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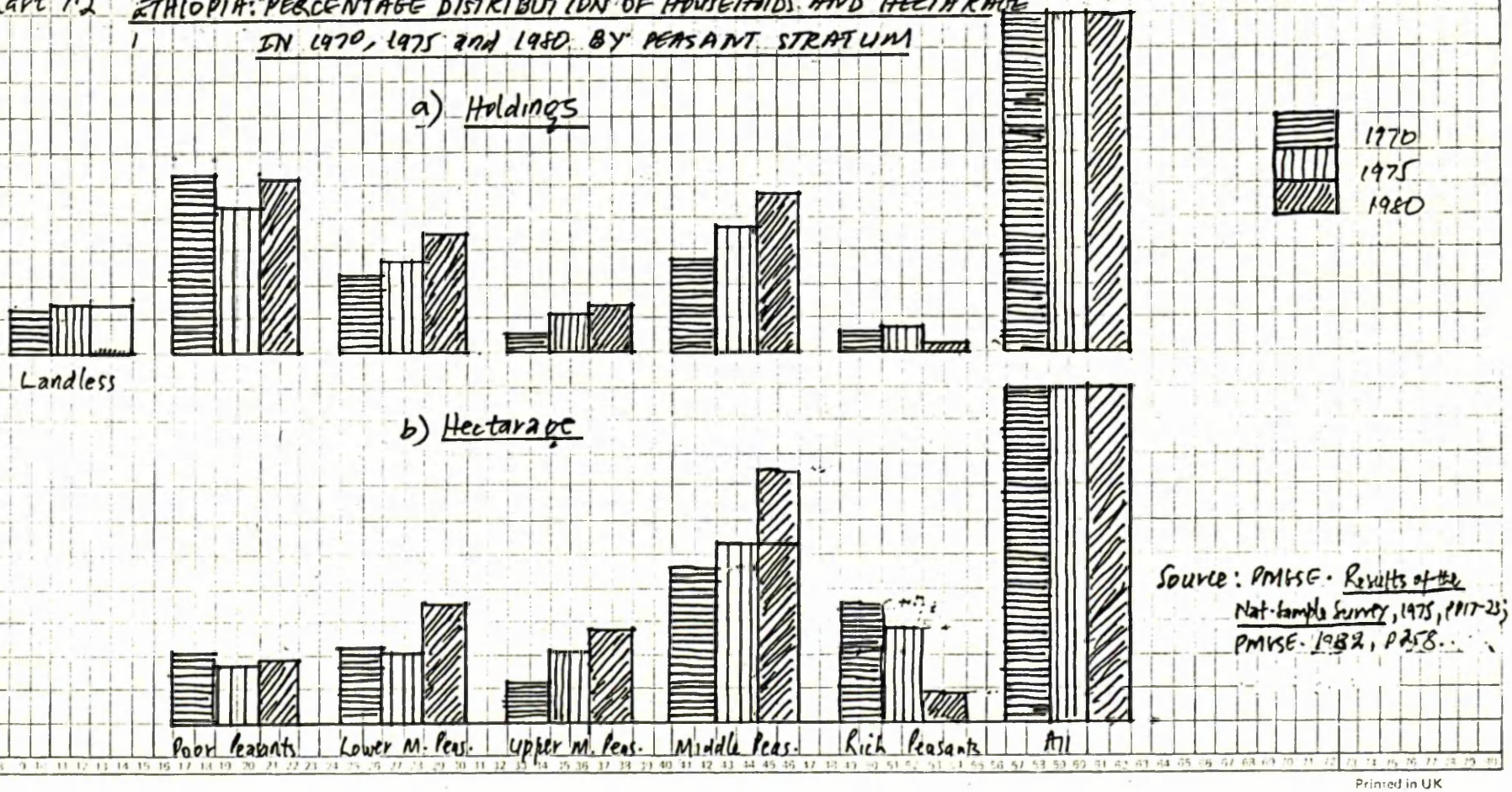
Chart 7.2 ETHIOPIA: PERCENTAGE DISTRIBUTION OF HOUSEHOLDS AND HECTARAGE IN 1970, 1975 and 1980 BY PEASANT STRATUM



Source: PMISE. Results of the Nat-sample Survey, 1975, 1977-25; PMISE. 1982, P258..

5.4 ETHIOPIA: INCOME DISTRIBUTION, THE MARKETED SURPLUS AND AGRICULTURE'S TERMS OF TRADE 1975-1980

In chapters four and six, we attempted to measure the level of the marketable surplus of cereals from estimates of area under crops, yield, peasant consumption, tax/rent, farm inputs and the commercial surplus in lieu of the demand for non-farm consumption and accumulation.

In this chapter, we extend the analysis to the whole of Ethiopia using sample survey data for 1966, 1969/71 and the annual crop sampling survey results in 1974/75-1979/80. We have set out below the aggregate estimated cereal output and its apportionment as in the analytical model explained in section four of Chapter one.

Table 7.8 Ethiopia: the Component of the Output of Cereals in 1966, 1971 and 1974/75 - 1979/80

a) Total '000 Tons

Sl. NO	Components of Output	66	70	74/75	75/76	76/77	77/78	78/79	79/80	% of growth 74/75-79/80
1.	Total Output	2,365	2,956	3,900	4,725	4,463	4,096	4,152	4,564	3.1
2.	Taxes	85	89	117	208	213	217	20	225	13.9
3.	Rent	402	503	780	-	-	-	-	-	-
4.	Obligatory Surplus	487	542	897	208	213	217	220	225	- 24.2
5.	Inputs	-	5	27	19	55	63	67	84	25.4
6.	Gross Dispos. for Cons.(1-4)	1,878	2,364	3,003	4,517	4,250	3,879	3,932	4,339	7.6
7.	Effective Cons. Dem.	1,439	1,977	2,702	3,214	3,302	3,073	3,107	3,215	3.5
8.	Min. Cons. Demand	2,086	2,891	3,478	3,645	3,771	3,636	3,673	3,770	1.6
9.	Commercial Surplus(5+6)-(7)	439	392	328	1,322	1,003	869	892	1,172	29.0
10.	Deficit of Marg. and poor Peasants (8-7)	647	914	776	431	469	563	566	519	-7.8
11.	Net marketed Output (15-10)	278	70	449	1,099	747	523	546	878	14.3
12.	State Farms	-	-	-	41	63	71	85	NA	19.9
13.	Imports-Exports	11	11	-6	-1	8	4	NA	NA	
14.	Total Supply (12+13+11)	289	81	455	1,139	818	601	631	878	14.0
15.	Total Marketable Surplus (4+9)	925	984	1,225	1,530	1,216	1,086	1,112	1,397	2.7

B) Index: Total Output in Each Year = 100

		66	70	74/75	75/76	76/77	77/78	78/79	79/80
1	Total Output	100	100	100	100	100	100	100	100
2	Taxes	4	3	3	5	5	5	5	5
3	Rent	17	17	20	-	-	-	-	
4	Obligatory Surplus	21	20	23	5	5	5	5	5
5	Inputs	-	0.2	1	1	1	2	2	2
6	Gross Dispos. for Cons. (1-4)	79	80	77	95	95	95	94	95
7	Effective Cons. Demand	61	67	69	60	74	75	75	71
8	Min. Cons. Demand Demand	88	98	89	77	84	89	88	83
9	Commercial Surplus Surplus	18	13	8	28	22	21	21	26
10	Total Marketable Surplus	39	33	31	32	27	26	27	31
11	Deficit of Marg. poor peas. (8-7)	27	31	20	9	10	14	14	11
12	Net Marketable Output	12	2	11	23	17	13	13	19
13	State Farms	-	-	-	1	1	2	2	-
14	Imports-Exports	0.5	0.5	-	-	-	-	-	
15	Total supply	12	3	12	24	18	15	19	19

C) Index: 1974/75 = 100

1	Total Output	61	70	100	121	114	105	106	117
2	Taxes	133	76	100	177	182	185	188	192
3	Rent	85	85	100	0	0	0	0	0
4	Oblig. surplus	91	66	100	23	24	24	24	25
5	Inputs		18	100	70	203	233	248	311
6	Gross Dispos. for Cons.	102	79	100	150	141	129	131	144
7	Effect. Cons Dem	88	97	100	119	122	114	115	119
8	Min Cons Demand	99	111	100	105	108	105	106	109
9	Commerc. surplus	225	162	100	105	108	104	106	108
10	Total Marketable Surplus	125	106	100	125	99	89	91	114
11	Deficit of Marg & poor peas.	135	155	100	55	60	72	73	67
12	Net Marketable Output	109	.18	100	245	166	116	122	196
13	State Farms	-	-	100	100	154	173	207	NA
14	Imports-Exports	NA	NA	100	-	-	-	-	
15	Total Supply	100		100	250	180	132	139	193

Source: PMGSE. Data Book on Land Use & Agriculture Vol. 1 AA 1982; PMGSE: Census in Ethiopia: 1985; PMGSE: Area, Yield and Production of Major Crops by Region and for the whole country, AA, 1980, p.13-18 IEG, CSO. Surveys of Provinces (12), Addis Ababa, 1966-1968

According to our estimations of the components of the disposal of cereal output based on the simple model explained in chapter four and subject to the limitations of the production data, the level of the obligatory surplus declined from 17-21% of the total output in the pre reform period to only 5% and its share of the gross marketable surplus from 75 to 16% in 1975/76-1979/80. Thus while direct surplus extraction by the state thus increased slightly from 3 to 5% of the total output, due to the remission of rent, the gross disposable output for consumption by the peasantry increased by 17% of the total output, this especially benefitting the hitherto tenanted rich peasants.[10] The aggregate disposal of cereal for consumption thus increased from 77-80% of the output in the pre reform period to 95% in the post reform period. From practically nothing in the pre reform period, inputs accounted for 2% of the total output or nearly 8% of the gross marketable output in 1979/80 - an important policy instrument linkage between the peasant economy and the non-agricultural sector. With the redistribution of holdings, in which middle peasants account for nearly ½ of the households and 3/4 of the acreage, the rent effect of increasing the marketable surplus is offset by the rise in effective consumption demand of the peasantry, which increased from about 65% to 75% of the total output-reflecting the shift from poor to

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10 With the redistribution of holdings, however, most of this gain eventually went to the middle peasant; its impact on the type of production and its implication for the marketed surplus is discussed more fully later.

middle peasantization in the post agrarian reform structure.

Similarly, the deficit of the marginal, poor and lower middle peasant (the difference between their effective and minimum consumption demand) declined, increasing the level of the marketable surplus for non-peasant consumption demand. The redistributive effect of the land reform favouring poor peasants and tenants increased the farm level consumption. On the other hand, this is offset by the increase in disposable income due to the new technology. In 1979/80, the absolute incremental output from the use of the new technology, 170,000 tons or nearly 5% of total output of cereals is 19%[11] of the level of the marketable surplus.[12] Given the very slow growth rate of national agricultural output, assuming the pre and post level consumption of cereals by the peasantry were the same (adjusted only by by the shift of a decline in the position in the post reform

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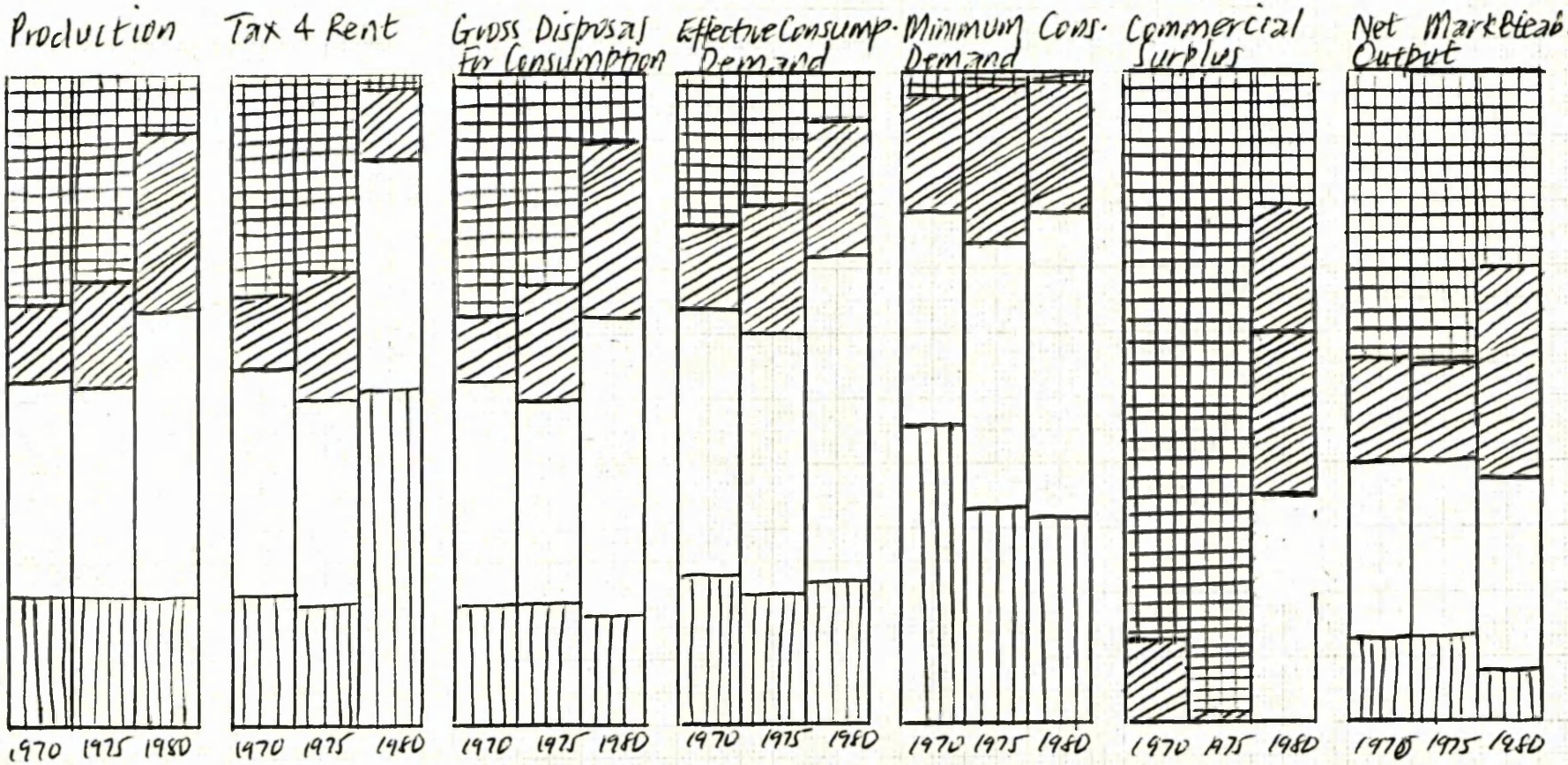
11. This is about 1/3 of the estimated urban demand for cereals in 1979/80 . (Table 11)

12. We have assumed no increase in the consumption level of own cereal output with other agricultural products or non-agricultural products, tending to increase (in the first case) or decrease (in the second two cases) the level of the commercial surplus of cereals. If any or a combination of the above were to take place significantly, the response of the commercial surplus and indeed the marketable surplus as a whole would be subject to the elasticity of response (both in their volume of output and substitution effect) of middle peasants to changes in their cereal output, the price of urban made consumption goods and other agricultural products. We think this a very important aspect of the peasant economy in the post reform period worth examining for pricing policy purposes which we are unable to undertake due to the unavailability of data.

period), the net effect of increased consumption and output is that marketable surplus as a percentage of total output increased by about 5%. However, due to the fall in the deficit demand by the lower stratum of the peasantry, the net marketable output of cereals in the post reform period was higher than in 1966 and 1970 or more meaningfully when compared with 1974/75. Total marketable surplus increased at 2.7% per annum in the post reform period (Table 7.8 Col.1). The net marketable surplus increased at 14.3% in the same period, indicating the fall in the deficit demand of the lower stratum of the peasantry with the redistribution of holdings. The components of the marketable surplus, percentage distribution by type and the change in index (1974/75=100) are given in table 7.8. Thus quantitatively, our analysis shows an increased level of the marketable surplus subject to the data base on production, population and cereal elasicity of demand by peasant strata set out in chapter four section six. See the attached charts for a graphic presentation of the above tables.

Chart 7.3: Ethiopia: % Distribution of Cereal Output and its Disposal in 1970, 1975 and 1980 by Peasant Stratum



Source: Chart 7.2, Table 7.8

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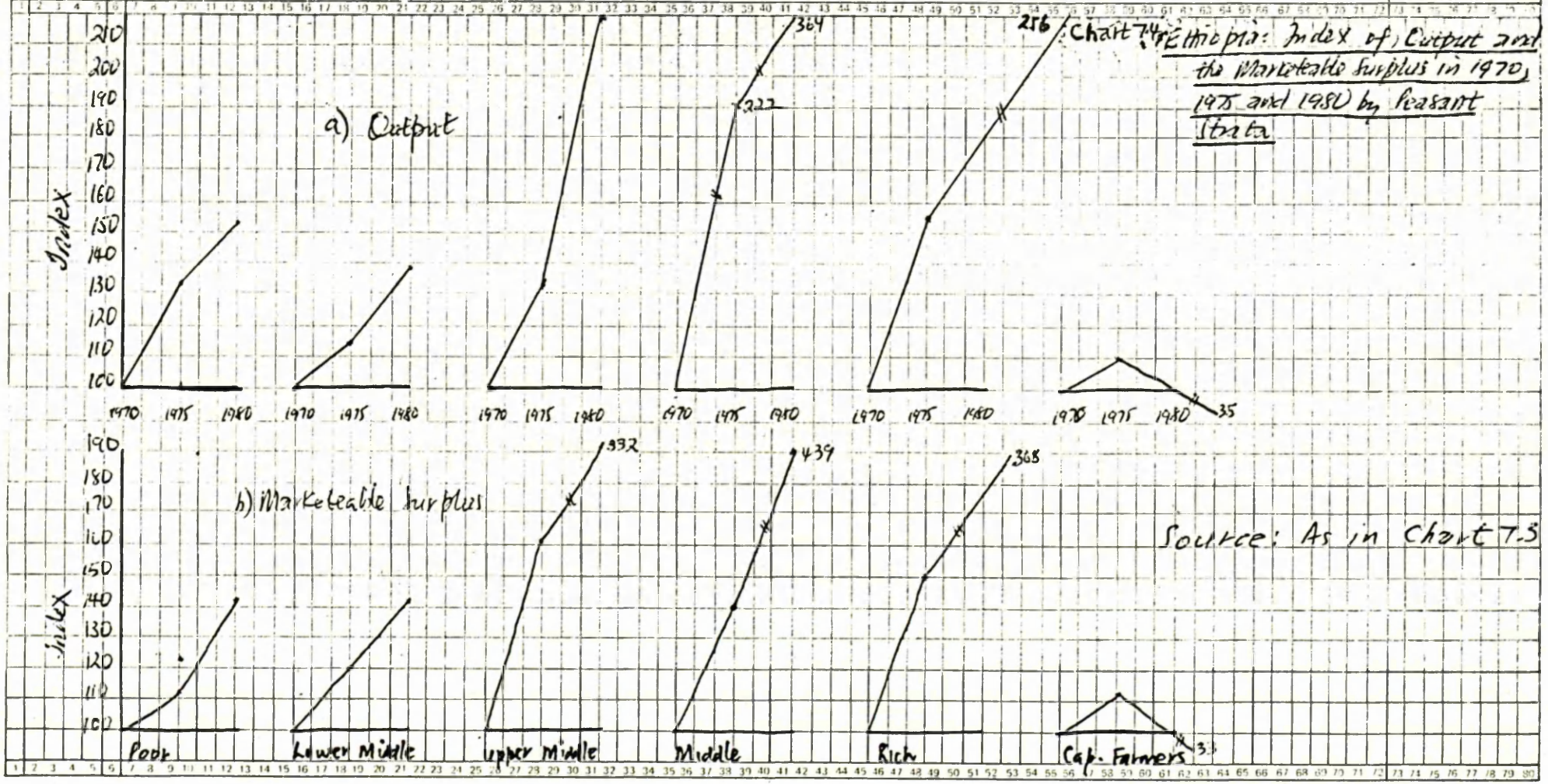

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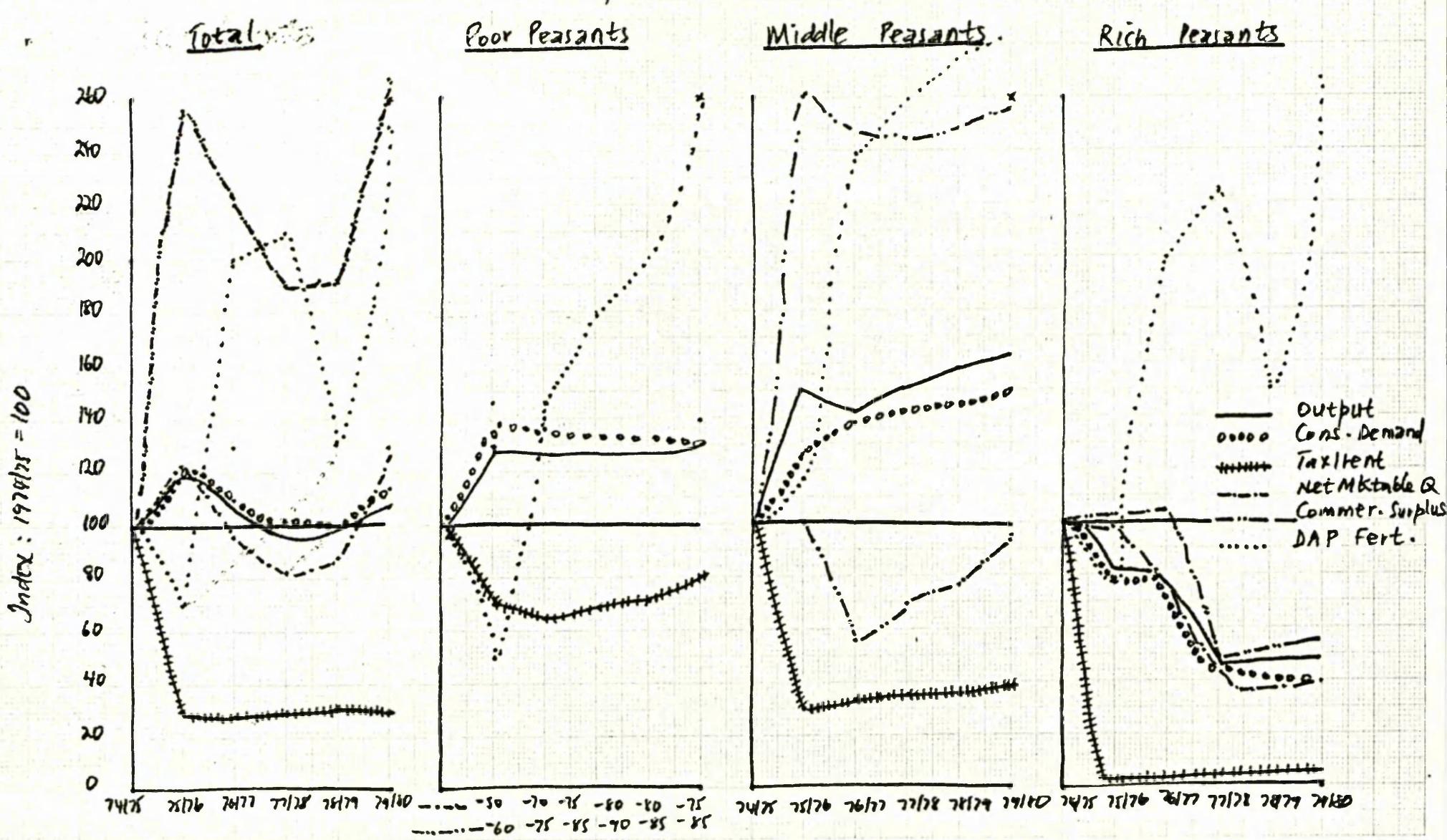
Chart 7.5 : Ethiopia: Index (1974/75=100) of Output, Consumption Demand, Tax/Rent, Net Marketable Output, Commercial Surplus and the Consumption of Fertilizer in 1974/75-1979/80 by Peasant Strata



Source: Table 7.10.

We present below the distribution of the total marketable surplus and its components temporally (1966, 1970, 1974/75-1979/80) and by peasant stratum.

Table 7.9: Ethiopia: The Distribution of Cereal Marketable Surplus in 1966, 1970 and 1974/75-1979/80

A) Total in '000 metric tons

SL NO	Year	Rent Taxes	SF	Inputs	CS	Total I	Total II
1	2	3	4	5	6	7	8
1	66	487	-		439	925	278
2	70	592	-	5	387	984	70
3	74/75	897	-	27	301	1,225	449
4	75/76	208	41	19	1,903	1,171	1,099
5	76/77	213	63	55	1,948	1,279	747
6	77/78	217	71	63	806	1,157	523
7	78/79	220	85	67	745	1,1117	546
8	79/80	225		84	1,088	1,397	878

B) Percentage Distribution by Type
Each Year = 100

1	2	3	4	5	6	7	8
1	66	53	0	-	47	100	
2	70	60	0	0.5	39	100	
3	74/75	73	0	2	25	100	
4	75/76	18	5	1	77	100	
5	76/77	17	4	5	74	100	
6	77/78	20	4	6	70	100	
7	78/79	20	7	6	67	100	
8	79/80	16	NA	6	78	100	

C) Index of Change: 1974/75 = 100

1	2	3	4	5	6	7	8
1	66	54	-	-	134	76	62
2	70	65	-	18	119	80	15
3	74/75	100	-	100	100	100	100
4	75/76	23	100	70	403	128	245
5	76/77	24	154	203	306	104	166
6	77/78	24	173	233	265	95	116
7	78/79	24	207	248	272	98	122
8	79/80	25	NA	311	357	114	195

Source: Derived from Table 7.8
Total I=Cols.3+4+5; Total II=Total I less cons.deficit of the Peasantry as in Table 7.8
S.F. = State Farms; CS = Commercial Surplus.

The following table shows the proportion of output and the marketable surplus by peasant strata in 74/75 and 79/80 (see attached charts 7.3 - 7.5).

Table 7.10 Ethiopia: The Percentage Distribution of Output and the Marketable Surplus by Peasant Strata '000 tons

Sl NO	Strata	1974/75			1979/80						
		Prod	Ob.	In-puts	CS	TMO	Prod	Ob.	In-puts	CS	Tot. Surp.
1	PP	18	18	22	-	15	19	51	18	-	8
2	LMP	32	32	33	-	26	45	35	59	38	32
3	LMP	20	20	11	1	16	27	12	13	43	30
4	MP	(52)	(42)	(44)	(1)	(42)	(73)	(47)	(72)	(81)	(62)
5	RP	30	30	34	99	43	8	2	10	19	30
6	Total	100	100	100	100	100	100	100	100	100	100

Source: Table 7.8 and Distribution by Peasant Strata: PMGSE, Data Book on Land Use and Agriculture 1982, pp. 255-260

TMO = Total Marketed Output

CS = Commercial Surplus

Ob. = Obligatory

The two most important structural changes in the behaviour of the marketed surplus in the two periods (pre and post reform) is thus the change from obligatory to commercial surplus (the former's share of the pre reform marketable surplus declining from 73% in 74/75 to only 16% in 79/80), and a shift of its overall supply from the rich to the middle peasants - 81% of the commercial and 62% of the overall marketable surplus came from the middle peasants in the post reform period. In our model, considering the already low levels of living and the sluggish growth rate of agriculture and the economy as a whole, we assumed no change in the level of consumption of cereals with the increased disposal for consumption after the reform. (i.e. apart from the difference

among the main strata of the peasantry). The deficit peasantry are unable to meet their minimum cereal consumption demand (which still falls short in the post reform period as shown in Table 7.8), while the middle peasants' marginal propensity to consume increased cereal is assumed to be zero directing their increased cereal incomes towards accumulation and/or increase in non-farm produced consumption goods. Considering the middle peasants command of (Table 7.10, Chart 7.3)
72% of the post reform period output of cereals, both surplus from consumption being non-obligatory, we may infer that if there is any significant elasticity of response (positive or negative) to consume own cereals (through substitution by other non-agricultural products and/or urban made goods) this assumes crucial importance in pricing policy of agricultural produce inputs, and non-agricultural incentive goods. This has also significance for the increased level of the adoption of the new inputs and thier intensifications. Under the uncertainty of pricing and marketing (GOE/WB: 1984) command of the marketable surplus by the middle peasant could hinder accumulation by the peasantry and the state which we propose is the case in Ethiopia as evidenced by high relative wholesale prices.

On the non-peasant demand side of the model, i.e. the nomadic and urban population growing at constant 2.6% and 6.6% respectively annually, the overall supply and demand of cereals fluctuated according to weather (affecting both the overall side of the supply and the

increasing demand of the deficit peasantry)[13] as shown in the following tables. The net marketable output (less the demand of the deficit peasantry) decreased from 1/3 to nearly 1/2 of the total demand (Table 7.12).

Table 7.11 Ethiopia: The Estimated supply and demand of cereals in 1966, 1970 and 1974/75 - 1979/80

A) Total in '000 tons

SL No	Year	Supply	Demand				Balance
			Peasantry	Urban	Nomadic	Total	
1	2	3	4	5	6	7	8
1	1966	936	647	255	80	982	-46
2	1970	995	914	308	87	1,309	314
3	1974/75	1,219	776	398	98	1,272	53
4	1975/76	1,529	431	425	100	956	573
5	1976/77	1,208	469	453	103	1,025	183
6	1977/78	1,082	563	483	103	1,143	-61
7	1978/79	1,112	566	514	105	1,185	73
8	1979/80	1,397	519	547	108	1,174	223

B) Percentage Distribution of Demand

SL No	Year	Demand by poor peasantry	Urban Demand	Nomadic Demand	Total	Balance
1	2	3	4	5	6	7
1	1966	65	26	8	99	-5
2	1970	70	23	7	100	8
3	1974/75	61	31	8	100	4
4	1975/76	45	44	10	99	60
5	1976/77	46	44	10	100	18
6	1977/78	49	42	9	100	5
7	1978/79	48	43	9	100	6
8	1979/80	44	46	10	100	19

Source: As in Table 7.8

13. This is of course an unrealistic assumption, as the urban demand could be met given the low purchasing power of the marginal peasantry in periods of drought; thus reducing their farm supply of cereal, demand for their labour and its price - See Sen, 1984 on the effect of drought and its impact for various sections of the rural and urban population.

As shown in the charts 7.6 - 7.11, although the per household output and the marketable surplus of cereals estimated from production and consumption of the peasantry increased consistently, in the post reform period (1975-1979), the Addis Ababa General Retail Price Index (AAGRPI) (of which 57% consists of food) increased at an annual rate of 17% compared to 2-3% in the pre reform period 1963-1975 (Chapter four Appendix, Table 16). The price index increased by 212 units from 158 in 1974 (1963=100) to 370 in 1979 (cf. 53 points in 1963-1974). Within the AARGPI, food items (specifically cereals) increased much more rapidly (Shifferaw: 1980) see table 12 below. Amongst cereals, the price of the 'coarse' cereals (maize, sorghum) increased relatively more than the higher valued teff and wheat (chart 7.6).[14] On the other hand, the composite[15] price level of cereals paid to the producers slightly lagged behind the pre agrarian reform period parities of the cost of production and producer prices - suggesting that the gains from increased wholesale prices did not trickle down

14. This is perhaps a reflection of the relative increase in output deriving from both yield and area expansion of teff (Table 7.3) and on the demand side the shift from teff and wheat to the coarse cereals especially in the urban areas with the fall in real wages. According to Saith (Saith: 1985, p.168), between 1974/75 and 1981/82 the real average monthly wage decreased by 30% while the Addis Ababa cost of living index increased by 131%. Both the supply factor for teff and the decreased demand per household for this marketed fine cereals may have offset the possible income effect of its substitution by the peasantry (decreasing their supply of wheat and teff with increased disposable income in the post reform period as there were also cash crops for payment of tax/rent resulting in higher relative prices for the coarse cereals).

15. The price of the five main cereals considered in the study viz. teff, wheat, barley, maize and sorghum weighted by their share of the marketed output in the respective years.

to the producers. Except for the cereal surplus Arsi and Cojjam, taking Khaki and the main cereals, the price terms of trade were favourable towards agriculture (chapter six, table 6.49). The non-agricultural sector appears to have experienced adverse terms of trade in its relation with agriculture. We present below the AAGRPI for selected items, the composite price of production, producer prices and Addis Ababa wholesale prices (See also charts 7.6. - 7.11).

Table 12 The Addis Ababa Retail Price Index (AARPI) in 1974-1979.

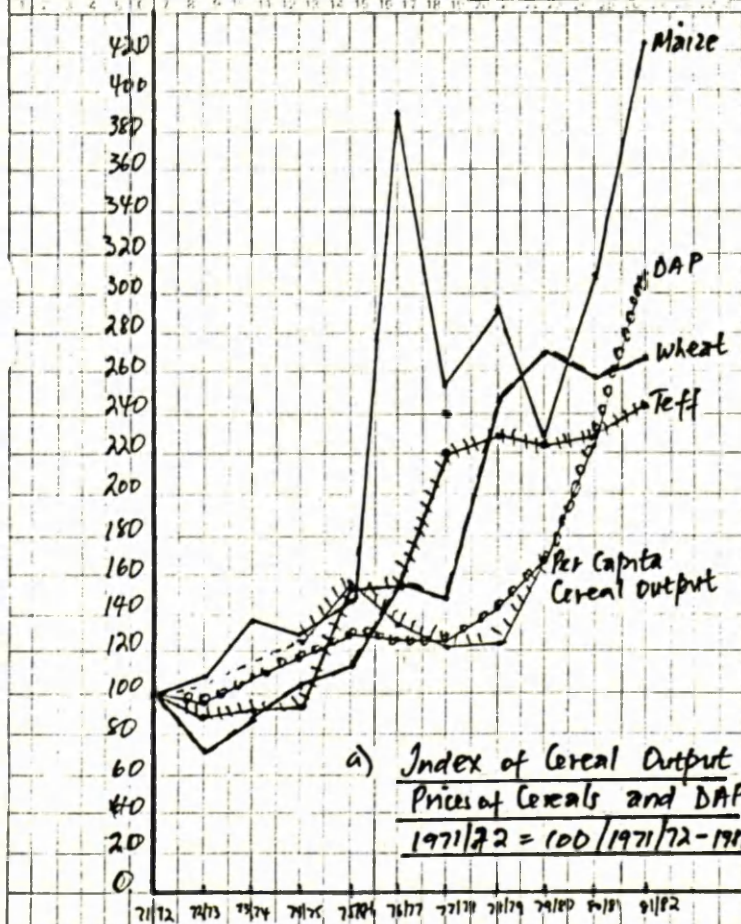
S/No	Items	Weights	Growth Rate
1	2	3	4
1	General Index	100	17.1
2	Food	57	20.4
3	Cereals		26.0
4	Meat		15.3
5	Dairy Products		17.1
6	Pulses		16.8
7	Household Items	17	15.9
8	Clothing	8	8.6

Source: Shifferaw Gurmu. "An Empirical Analysis of price trends in Ethiopia" Ethiopia Journal of Development Research Vol.14, No.2 1980, pp. 13-38, p14 & 26

Chart 7.6

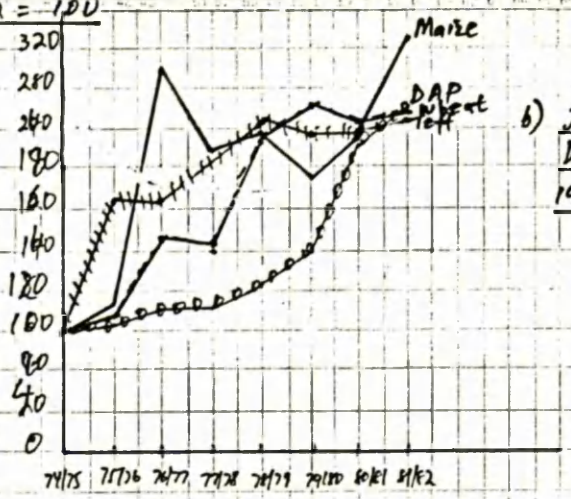
Addis Abeba

Price Index of Cereals and DAP 1971/72 - 1981/82



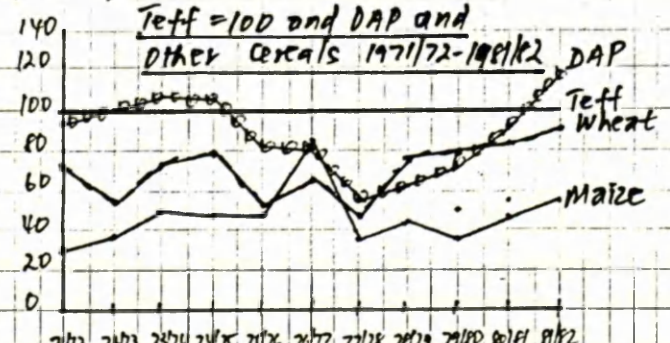
a) Index of Cereal Output
Prices of Cereals and DAP(ARP)
1971/72 = 100 / 1971/72 - 1981/82

1971/72 = 100



b) Index of Prices of
DAP and Cereals in
1974/75 - 1981/82 : 1974/75=100

c) Relative Price Index of
Teff =100 and DAP and
Other Cereals 1971/72-1981/82



ARP = Addis Abeba Retail Price

Source: Gur-Ekbl World Bank : 1983 : P108

Table 7.13 Ethiopia: Estimated Composite Cost of Production of Cereals, Producer Prices, Addis Ababa Wholesale Prices and the Index of Change in Price Margins in 1974/75-1979/80.

SL No	Year	PRICES Birr/Qtl			INDEX: CP = 100			CHANGE IN MARGINS	
		CP16	PP17	AWSP18	CP	PP	AWSP	PP-CP	AWSP-PP
1	2	3	4	5	6	7	8	9	10
1	74/75	18	20	24	100	111	133	100	100
2	75/76	21	22	53	100	105	252	45	668
3	76/77	24	28	54	100	117	225	154	491
4	77/78	27	30	59	100	111	218	100	486
5	78/79	31	32	69	100	103	222	27	541
6	79/80	35	NA	(62) 77	100	NA	220	NA	NA
7	$\bar{X}$75/76-79/80		28	62	100	109	227	81	546

Source: PMGSE. Data Book on Land Use and Agriculture, 1982 Vol. 2 pp182-254

CP= Cost of Production
PP= Producer Prices
AWSP= Addis Abeba wholesale prices
PP-CP= Producer Prices less cost of production
AWSP-PP=AA Whole sale prices less producer prices

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16. 1974/75 and 1977/78 national cost of production of the five main cereals weighed by 1974/75-1979/80 volume of the marketed output and extrapolating the same for 78/79 and 78/80.

17. Producer prices at main regional market centres for the respective cereals PMGSE: 1983; pp 203-254

18. AAWSP = Addis Ababa wholesale prices; PMGSE: 1983: pp.203-54 Govt. of Ethiopia/IBRD: 1983: P.82

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Chart 7.7a

Ethiopia: Estimated Demand For Cereals 1974/75-1979/80, and the Ratio of Rural, Nomadic and Urban Demand and the Addis Ababa Composite Retail Price Index

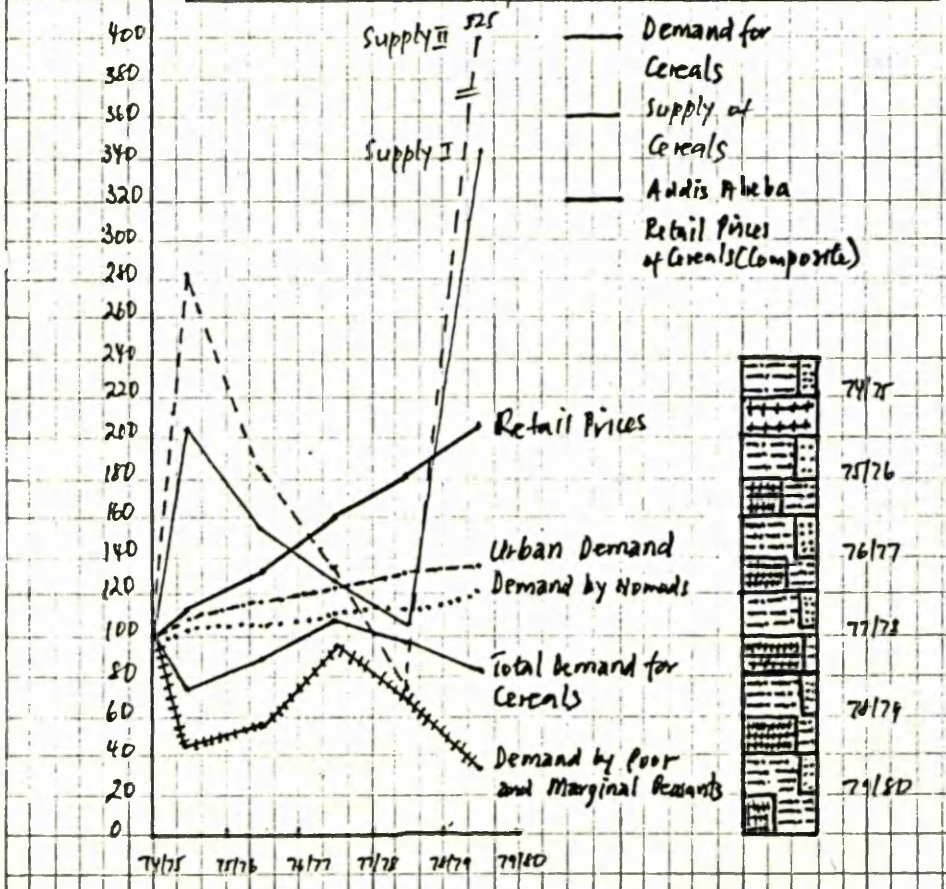
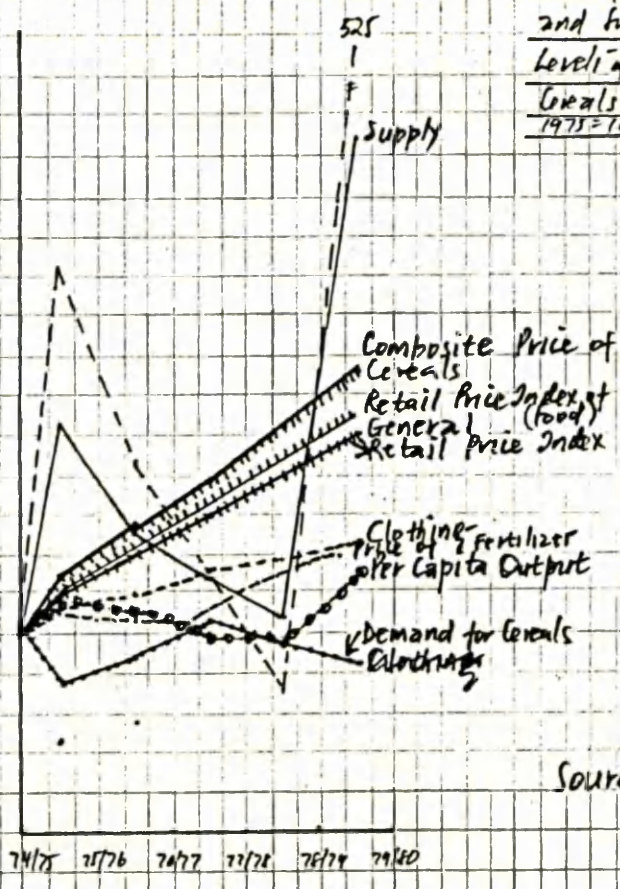


Chart 7.7b

Ethiopia: The Estimated Demand and Supply of Free Cereals and Price Level of (Addis Ababa Index) - General, Cereals, Food, Fertilizer and Clothing 75-80
1975 = 100



Per Capita Output
Supply of Cereals Estimate I
Supply of Cereals Estimate II
Total Demand for Cereals
Composite Price of Cereals
General Retail Price Index
General Retail Price Index of Food
Price of Fertilizer (DAP)
Clothing

Source: Table 7.10; PMGSE/World Bank Mission, 1983, PP 101-1
PMGSE, 1982 1. P 182, 203-2
Shifferaw Gurmu, 1980, pp 13-38

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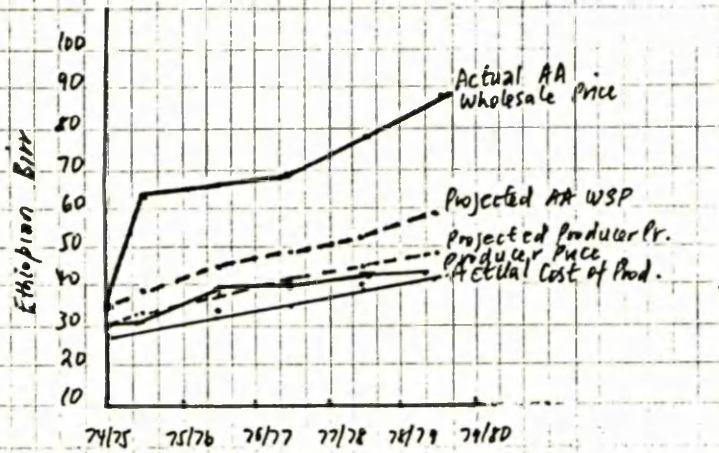

Chart 7.8
Ethiopia: Estimated Composite Production, Producer and Addis Abeba Whole sale Prices of Cereals (Actual and Projected) in 1974/75 - 1979/80

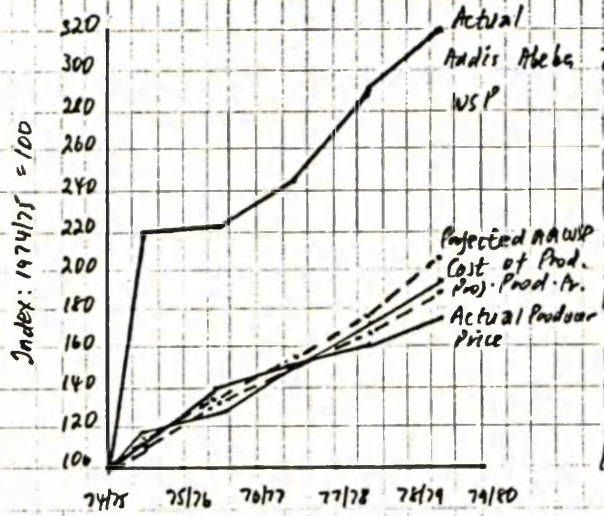

Chart 7.9
Ethiopia: Index of Estimated Production, Producer and Addis Abeba Composite Wholesale Prices of Cereals (Actual and Projected) in 1974/75 - 1979/80

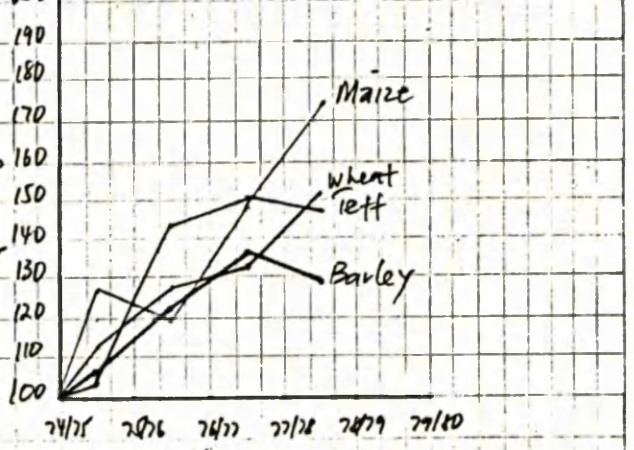

Chart 7.10
Ethiopia: Index of Producer Prices of Maize, wheat and teff in 1974/75 - 1979/80

Source: PMGSE, 1983, P.57, PP102-112; P.57, PP102-112; PMGSE: 1982, P182, 187, 203-247

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Overall, the proportion of the margin between the cost of production and producer prices declined by 19 percentage points, resulting in lower production prices for the producers, part of which is compensated by their improved terms of trade with non-agriculture (see Chart 7.6; 7.7) The margin between the Addis Ababa wholesale and the producer prices on the other hand increased by 2.3 times in 79/80 compared to 1974/75. The mean differential between the producer and the wholesale price increased by nearly 5½ times. In the provincial centres, the price ratio of cereals and khaki was more than one, indicating favourable terms of trade to agriculture (although khaki alone is perhaps not adequate as a representative for urban trade rural consumption goods). If the cost of production and the producer and wholesale price parities in the pre reform period were to be maintained in the post reform period, assuming marketing costs increasing at general price levels, the mean producer prices are less than the projected prices by 30% while the wholesale prices are higher by 100%. (charts 7.8-7.9).

With the generally sluggish overall growth of the economy and the low level of wages (frozen since 1975/76 for middle and higher level salariat (Saith: 1985; Griffin: 1985), the higher level of wholesale prices couldnot have been triggered by rising real income levels among the market-dependent urban population. Following the redistribtion of holdings, the resulting trend towards middle peasantization and the possible contraction of the rural labour market, and given the lower mean acreage held by the poorer sections of the rural households, it is unlikely that the post reform poor peasants were

able to exert a significant upward pressure on the price level. The above analysis, based both on the actual and projected price levels (the latter taking into account the inflationary impact on the cost of marketing), suggest large trading surpluses in the marketing channels, at the expense of the urban consumers, and proportionately more from the low income ones. Consideration of the already low levels of income, the shrinkage in the labour market and the lagging behind of the relative price of labour (see chapter six, section six), brings to the fore the adverse term of trade suffered by the poor peasantry (in relation to the price of its labour power and purchase of cereals to meet its minimum consumption demand). This is even further aggravated by the seasonal variation of cereal prices especially, the coarse ones (Appendix Table 4). The low supply month average prices when the deficit peasantry enter the market to buy cereals were higher than the harvesting season equivalent months by as much as 150% and the more so for the coarse cereals (Saith:1985).

Despite its proportionately greater taxing of the rural and urban poor, it could be argued that the pricing system is feasible as an accumulation strategy. We thus further analysed the quantity of the marketed surplus by marketing channels, the cost of marketing and their implications for accumulation in the economy. According to our model of the supply and demand of cereals and the post agrarian reform marketing channels - private traders and the government Agricultural Marketing Corporation (AMC) reported by Saith and Griffin (Saith: 1985; Griffin: 1985, Ghose '85) - modified to

take into account possible peasant cum merchant transactions in 1979/80, nearly 1/3 of the marketable surplus of cereals was handled by the AMC. Of this amount, it purchased at fixed prices from state farms (32% of its total), merchants (43%), peasants (22%), and service coops, selling to exclusively urban consumers at fixed retail prices. Marketing transactions between peasants and peasant cum merchants (21% of the total marketable surplus) and between peasants and merchant (43% of the total marketable surplus) accounted for the remaining 2/3 of the marketable output. (See attached chart No.7.12 for the source, share, flow and transaction with consumers of the marketed output). Excluding the minimum consumption demand deficit of the urban poor, but taking into account the marketable surplus entering the wholesale market via the AMC and merchants, we estimated the distribution of the marketing gross surplus by the AMC and the merchants and their respective share of the value of the marketed cereals in 1979/80 as in the following table.

Table 7.14 Ethiopia: The Distribution of the Final Value of the Marketed Output by Producer and Marketing Institutions in 1979/1980

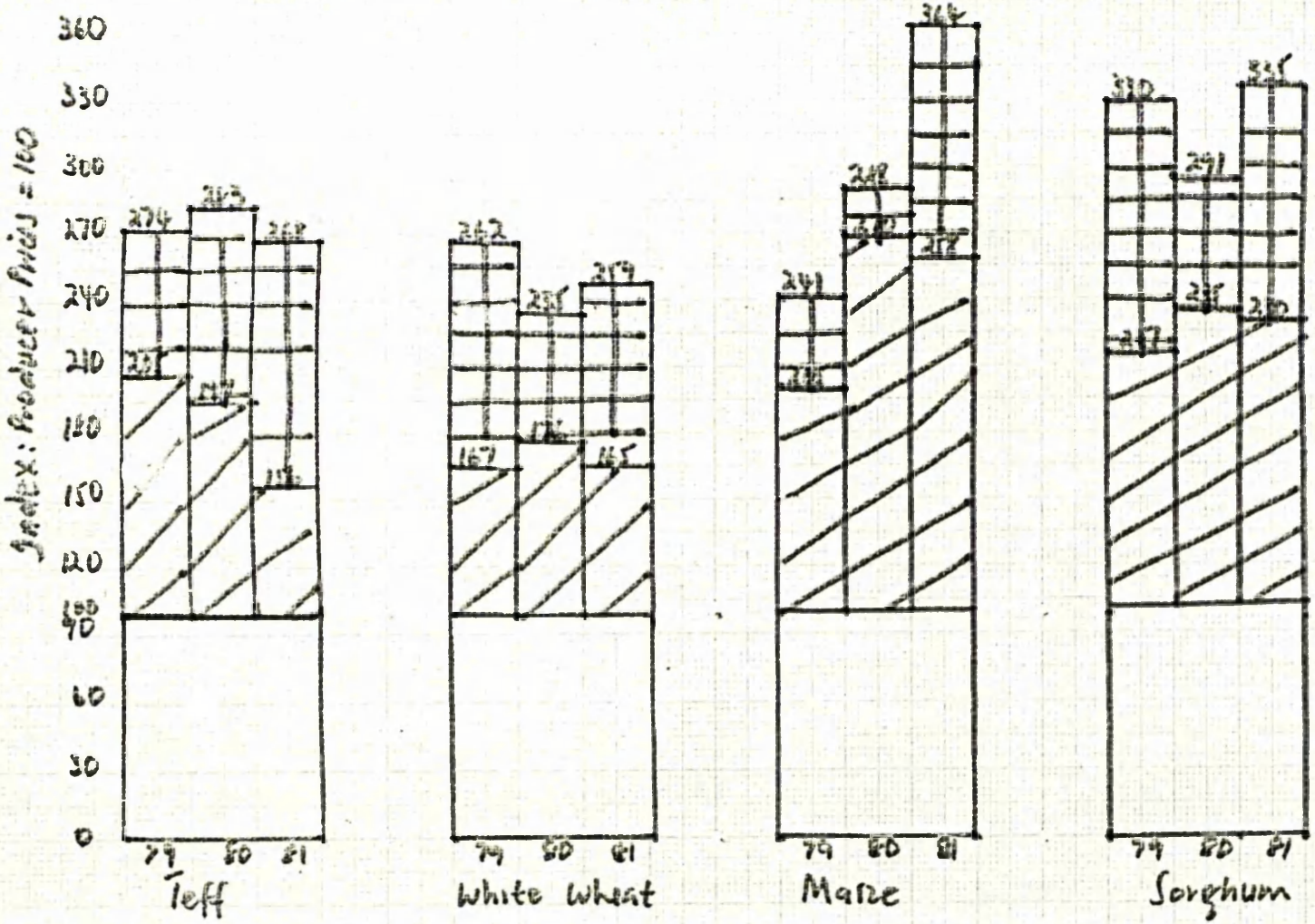
SL NO	Components of Output	Mill. of Birr	Index: AA Value=100
1	Addis Abeba Value of cereals[19]	670	100
2	Producer Incomes[20]	314	47
3	Gross Marketing Margin (1-2)	356	53
4	Estimated Cost of Mkting[21]	98	15
5	Net Marketing Surplus	258	39
6	Share of Merchants (57%)	147	22
7	Share of AMC (43%)	111	17

Source: Table 7.8 (Mktable output), 7.13 (for prices and marketing margins) Saith: '85 for share of merchants & AMC

19. Taking the respective qty. of share of AMC & merchants & their whole sale prices. Saith: 1985.
20. The composite value at provincial retail supply markets given in Table 7.13.
21. Raising the 20% gross mkting margin over producer prices at the onset of the reform (Table 7.13) increased to 31% to take into account possible uncertainty in the marketing chain following govt intervention giving a more competitive edge to suppliers of food commodities from reduced volume of handling due to state buying.

Even increasing the ad valorem gross marketing margin by 50% of the producer prices (from 20% in 74/75 to 31% in 79/80), the 'net marketing surplus' of 259 million Birr is still about 82% of the value of the marketable surplus due to cereal producers. Considering the net marketed surplus made up about 13% of the total value of cereal output, the net trading surplus thus accumulated (heavily tilted against the urban and the rural poor) is 5% of the estimated cereal output - equivalent to the level of direct taxation. A 10 % rate of potential accumulation in agriculture (assuming price terms of trade between agriculture and non-agriculture is constant) while impressive, conceals the fact that most of at least the 'net surplus' by the AMC is marketing cost on the top of the 31% mark up estimated for producer prices. For the 1981/82 trading season, it was estimated that only 4.1% of the mark up price between the AMC's purchase and its retail price was 'net surplus' - 95.9% being marketing cost - impurities 40%, 14% bags, 26% transport and 25% trading cost (fixed costs - personnel, building etc.) (Saith: 1985; p.170). Our analysis thus suggests that in the post reform period, producer prices have nearly maintained their production cost parity,. Together with their slightly improved terms of trade with non-agriculture, the users of the new technology while constrained by middle peasantization with respect to accumulating appear to have reaped the benefits of the new technology. The astronomic rise in consumer prices, most pronounced in its variation and relative increase among the coarse cereals is due to the high marketing cost of the AMC and possible high levels of profit

Chart 7.11: Ethiopia, Index of Producer Prices, Agric. Mktg Corporation (AMC) and Open Market Grain Marketing Margins in Addis Ababa, 1979-81



Source: Computed from Saith, A. "The Distributional Dimensions of Rev. Transition: Ethiopia", Journal of Devt Studies, vol. 22, No 1, Oct. 1985, P. 171.

Chart 7.12: Ethiopia Marketing Chains and Volume Handled in the Wholesale of Major Cereals in 1981/82

R No	Producer	Marketeable Surplus Tons (000)	Marketeable Surplus %	Marketing Transactions '000 tons		Consumer's Supply Share Tons (000)	Consumer's Supply Share %
1	Peasants	1,088	88	260 (24%) → Peasants	→	260	21
2	State Farms	141	11	730 (67%) → Merchants	→	536	43
3	Peasant Coops	12	1	98 (9%) → AMC	→	445	36
				141 (100%) → AMC			
				12 (100%) → AMC			
				Merchants 194 (26%) ↓			
				AMC: % State Farms 32; Peasants 22; Merchants 43; Coop 32			
4	Total	1,241	100			1,241	100

AMC = Agricultural Marketing Corporation

Source: Constructed from Saith, A. "The Distributional Dimensions of Revolutionary Transition: Ethiopia" Journal of Development Studies, Vol. 22, No 1, Oct. 1985 PP150-179; Griffin, K. and Roger Hay. "Problems of Agricultural Development in Socialist Ethiopia: An Overview and Suggested Strategy" Journal of Peasant Studies, Vol 13, No PP37-66; Ghose, A.K. "Transforming Feudal Agriculture: Agrarian Change in Ethiopia Since 1974" Journal of Development Studies, Vol. 22, No 1, PP127-149.

margin[22] by the merchants. According to the Land Reform Proclamation of 1975, investment in holdings of greater than 10 hectares was precluded (chapter one, section 1.3) by law. With the limited entrepreneurship and participation in other spheres of production in the economy, the channelling of a bulk of the agricultural surplus towards the expansion of the marketing of goods and services (high salaries, modern marketing equipment, etc.) in the state sector and the accumulation of merchant capital, along with the relative price rise of coarse cereals, could have adverse effects upon the distribution of income and upon accumulation. It could increase the gap in the distribution of income between the poor peasants and entrepreneurial middle peasant cum merchants; between the urban poor and the salariat petty bourgeoisie anchored in the apparatus of the state and the mercantile bourgeoisie), It could also direct the structure of consumption and capital goods demand in the economy towards imported goods (both legal and illegal) without increasing the accumulation base of the agricultural economy at the farm and national level. The fragmentation of the rural cereal markets, the higher rather than static level of consumption assumed by our model, a possible marketing strategy to maximise incomes through dispersed sales unfettered by the forcible disposition of the pre reform tax/rent, and possible downward bias of prices especially if given by the producers

22. In view of the fact that almost 100% of the pre agrarian reform period cereals was marketed by merchants, we do not see any reason why their marketing cost margin would rise by more than 50% after taking into account the general level of price rise according to our analysis in table 7.12.

themselves may have overestimated the net surplus accumulation by the private and state middlemen, altering to some degree the ratio of farm level incomes and merchant capital and state marketing cost in our analysis.

To assess the overall distributional and accumulation impact of the new reform and the marketable surplus of agricultural output, however, one would also require a systematic price series of urban made rural consumption goods and agricultural inputs. Our analysis above, suggests that while the middle peasantization and the new technology increased the output, consumption levels of the peasantry and the surplus middlemen, the accumulation effect of the post agrarian reform period marketing system appears to be negative.

Based on the redistribution of holdings discussed in section three, change in the level of taxation/rent, the consumption model introduced in chapter four, and changes in the price levels of wages, and inputs, we attempted to assess the redistributive impact of the agrarian reform by peasant strata.

If 1975 and 1980 adequately represent the inter reform period of 1975-1980, the average cereal income of the poor peasants decreased by 9% while that of the middle peasants as a whole increased by 51% (See Table 7.15). The former is mainly because of the allocation of tiny plots of land to the hitherto landless peasants which made up nearly 12% of the pre reform period agrarian population (see Section 3). The new land use fee instituted in lieu of the pre reform tax/rent increased the

average disposable income levels of the peasantry by as much as 17%. Being a flat household rate, however, it benefited the upper stratum of the peasantry relative to gross income level and also in absolute terms, due to the inverse relations of household size and incomes. at this strata level.
Although the input/output price terms of trade benefitted the peasants by 14%, because of the lower level of use of inputs (but steadily increasing), its contribution towards an increase in relative incomes in the post reform period is marginal. The other main measurement of the terms of trade, the composite price of cereals and urban made rural consumption goods, appears to have been favourable to agriculture by nearly 10% for its main beneficiaries - the middle and rich peasants who marketed most of the commercial surplus. It suggests a net gain in income of 2% and 7% respectively. Due to the estimated smaller net availability of wages in the post reform period arising from both legal restrictions and the levelling of holdings, its lower relative prices with respect to cereals and the price increase of cereals and urban consumption goods for the cereal deficit poor peasantry, the latter were adversely affected by as much as 19% of their total incomes. We present below the distribution of income by peasant strata at the onset of the agrarian reform in 1974/75 and five years later in 1979/80.

Per Household

Table 7.15 Ethiopia: Changes in the Distribution of Incomes between 1974/75 and 1979/80 in tons of cereals * by Peasant Strata

a) Distribution of Average Cereal Incomes (tons) in 1979/80

SL No.	Str-ta	GY	Tax Change	Disp osal	Inputs	Wage	Oth Income	Cons. Demand	Commercial Surplus
1	2	3	4	5	6	7	8	9	10
1	PP	0.43	-0.06	.37	Neg	0.01	0.26	0.64	-0.27
2	LMP	1.20	-0.05	1.15	-0.02	-	-	0.90	0.14
3	UMP	1.84	-0.04	1.09	-0.oi	-	-	1.12	0.67
4	MP	(1.34)	(-0.04)	1.35	(-0.02)	-	-	0.97	0.35
5	RP	4.5	-0.04	4.51	-0.03	-0.01	-	1.35	3.07
6	Tot.	1.02	-0.05	.97	-0.02	-	-	0.84	0.11

b) Distribtion of Average Cereal Incomes (tons) in 1974/75

1	PP	0.47	-0.09	.38	Neg	0.08	0.18	0.64	-0.26
2	LMP	1.03	-0.21	.82	Neg	Neg	0.09	0.91	-0.09
3	UMP	1.41	-0.28	1.13	Neg	Neg	-	1.12	0.01
4	MP	(1.15)	-0.23	(1.92)	Neg	Neg	0.05	0.97	-0.05
5	RP	4.3	-0.86	3.44	-0.03	Neg	-	1.35	1.98
6	Tot.	1.10	-0.22	0.88	Neg	Neg	-	0.84	0.04

c) Net Change in Incomes 1974/75-1979/80

SL No.	Strata	GY	Tax	Disp o-sal	UCGTT	Total
1	2	3	4	5	6	7
1	PP	-0.04	+0.03	-0.01	-0.03	-0.04
2	LMP	+0.17	+0.16	+0.33	+0.01	+0.34
3	UMP	+0.43	+0.24	+0.67	+0.07	+0.74
4	MP	(+0.24)	(+0.19)	(+0.43)	(+0.04)	(+0.47)
5	RP	+0.2	0.82	+0.84	+0.31	+1.15
6	Total	-0.08	0.17	+0.09	+0.01	+0.10

d) Percentage Change in 1974/75-1979/80

1	2	3	4	5	6	7
1	PP	-8	-50	-3	-10	- 9
2	LMP	16	-76	+40	10	41
3	UMP	30	-86	+59	10	65
4	MP	(21)	(-83)	(+46)	(10)	(51)
5	RP	5	-95	28	(10)	33
6	Total	-7	-77	10	(10)	11

UCGTT - Urban made rural consumption goods terms of trade, GY= Gross Income in tons of cereals.

* Based on redistribution of holdings(Table 7.7) & number of households by holding size (PMGSE:1982 & 1984 pp.256-260; taxes & rent(Table 4.12) Inputs(chart 7.5), wages (Table 6.49), consumption (chapter 1 sect.4) and UCGTT (Table 6.48).

5.5 CONCLUSION

Between 1975 and 1980, the Ethiopian agrarian economy underwent two broad structural changes - the widespread use of the new technology inputs which were used in earnest from 1970 in peasant agriculture and a radical redistributive agrarian reform through the revolutionary elimination of the hitherto largely absentee and resident "proto" landlord social class. Within this short space of time, a leap both in the institutional and technological base of its agriculture took place perhaps unparalleled in its agrarian history. It is relatively a short span of time for a definitive evaluative study with policy implications for further reform and useful lessons for applications elsewhere. However, a comparison of the pre reform and post reform agrarian structure, class formation, change in the level and components of the marketed surplus, price trend, accumulation, distribution of incomes and terms of trade suggest important problems in the realm of the synchronization of the relations and forces of production for a revolutionary agrarian transition from a very low level of the productive forces.

An annual increase of 26% in the consumption of fertilizer in 1975-1980 with an incremental output accounting for about 1/3 of the total marketable demand for cereals in 1979/80 suggests given its low base, a wide scope for raising agricultural productivity and increased output via fertilizer use alone. With the redistributive agrarian reform, and the trend towards middle peasantization in its aftermath, the lower levels of obligatory surplus, the disposal for consumption by the peasantry increased markedly compared to the pre reform period. However,

the rise in land productivity from at least about 13% of the total acreage fertilized in 1980 from a mere 3% in 1975, led to a compound rate increase of 14% in the net marketable supply of cereals (obligatory + commercial surplus less the deficit consumption demand of the poor peasantry) in 1975-1980. The regional and interclass variation in output within the peasantry significantly reduced the redistributive efficiency of the increased output despite the agrarian reform of 1975. Judged from the consumption of fertilizer, cereal production, the 1984 census results and prices of cereals, the failure to attain a minimum levels of consumption by the urban and the rural poor in the post reform period appears to hinge largely on the perverse effect on the poorer section of the peasantry of redistribution, taxation (biased against the poorer peasantry) and, more important, marketing and institution building policies. Net of marketing cost, a marketing surplus of about 40% of the farm value of the marketable cereal output in 1980 by state and private trading firms (possibly channelled towards higher than necessary marketing cost in the state sector vis-à-vis the private sector and the dissipation of merchant capital in conspicuous consumption) severely constrained the reproductive and distributive capacity of the agricultural economy. The ability of increased productivity from the new technology to lower food prices for urban accumulation, and welfare to the food deficit peasantry, stabilize prices to the peasantry both to increase the pace of the adoption of the new technology and creating demand for industrial goods appear to have been unrealized because of the accumulation of merchant capital. While the terms of trade for agriculture vis-à-vis its purchased inputs

and urban consumer goods improved slightly, urban cereal prices especially those of the coarse cereals outstripped the level of general price rises against severely restricted wage increases.

Appendix 7.1 The Quantity of New Productive Capital (Tractors, Fertilizer and Fuel) Inputs in Ethiopian Agriculture 1958-1972

SL No.	Year	Farmers with Tractors		Tractors		Area Cultivated by Tractors			Fertilizer Inputs			Subsidized Fuel '000	
		No.	Index	No.	Index	'000 Ha	Index	% tot.Ha	'000 Tons	Index	% tot.Ha	Litres	Index
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1958	11	1	62	6	1.5	2	NEG	NA		NA	55.0	1
2	1959	32	3	115	11	6.2	6	NEG	NA		NA	232.0	2
3	1960	22	3	196	19	6.5	7	NEG	NA		NA	518.0	5
4	1961	31	4	222	21	10.5	11	0.1	0.5	11	NEG	2,046	20
5	1962	38	4	165	16	13.0	13	0.1	1.7	38	0.1	1,109	11
6	1963	197	23	256	25	36.5	37	0.3	2.6	58	0.2	1,400	14
7	1964	486	56	393	38	53.5	54	0.4	2.8	62	0.2	5,316	53
8	1965	686	80	747	72	74.9	75	0.6	1.2	27	0.1	8,809	87
9	1966	861	100	1,045	100	99.3	100	0.8	4.5	100	0.3	10,099	100
10	1967	1,169	136	1,271	122	130.2	131	1.0	3.2	72	0.2	17,718	175
11	1968	1,199	139	1,398	134	177.0	178	1.4	8.2	184	0.6	21,673	215
12	1969	1,560	181	1,896	190	215.0	216	1.6	10.1	227	0.7	27,795	275
13	1970	1,925	223	2,492	239	351.5	354	2.7	22.6	507	1.7	33,691	334
14	1971	2,622	305	2,913	279	481.7	485	3.6	17.3	389	1.3	45,790	453
15	1972									1,075	3.6		

Source: Tecle Tesfaye, An Economic Evaluation of Agricultural Package Programmes in Ethiopia, Cornell Univ., Ph.D., 1974, p.171.

App 7.2. Distribution of Improved Seed 1978/79 - 198//82 ('000 Qtls).

	Sector	78/79	79/80	80/81	81/82
1	2	3	4	5	6
1	State Farms	24.1	63.6	156.5	176.2
2	Settlement Prog.	5.9	7.9	8.3	9.0
3	Peasant Assoc.	23.2	26.8	32.8	31.7
4	Peasant Coop.	-	-	1.2	3.5
5	Total	53.1	98.3	198.8	220.4

Source: Joint Gov. of Eth/World Bank Mission Review of Farmers' Incentives and Agricultural Marketing and Distribution Efficiency, 1983. p. 95.

App. 7.3 Administrative Regions Ranked by Land Productivity Compared with Rank of Size of Holding and Cultivation Intensity

Region	Crop Yields Highest to Lowest	Cultivation Intensity Highest to Lowest	Size of Holding Lowest to Highest
Bale	1	10	7
Arsi	2	11	10
Wollo	3	3	5
Gondar	4	4	12
Shoa	5	12	8
Kffa	6	5	4
Sidamo	7	9	2
Ilubaber	8	8	6
Gojjam	9	1	11
Harerge	10	2	3
Wellega	11	7	9
Gemu Gofa	12	6	1

Source: Griffin, K.& Roger Hay. "Problems of Agricultural Development in Socialist Ethiopia: An Overview and Suggested Strategy" Journal of Peasant Studies Vol. 13 No. 1, 1985, pp. 42-46.

App. 7.4 Coefficient of Variation of Annual Cereal Prices in Ethiopia in 1975-1980.

Teff	34.4
Wheat	24.9
Maize	37.5
Barley	21.1
Sorghum	49.3
Millet	71.6

Source: Saith A. "The Distributional Dimension of Revolutionary Transition: Ethiopia" Journal of Development Studies, Vol. 22, No. 1 Oct. 1985 p. 150-159

App. 7.5 Results of the 1984 Census and Projections Backwards Assuming 2·6% & 6·6% Growth Rate for Rural and Urban Population Growth Rate Respectively for Selected Years

SL NO	Year	Rural	Sedentary	Nomadic	Urban	Total
1	1984	37.2	32.4	4.8	4.8	41.9
2	1980	33.2	28.9	4.3	3.6	37.1
3	1979	32.4	28.2	4.2	3.4	36.2
4	1978	32.1	27.9	4.2	3.2	35.3
5	1977	31.5	27.4	4.1	2.9	34.4
6	1976	30.7	26.4	4.0	2.8	33.5
7	1975	30.1	26.2	3.9	2.6	32.7
8	1970	26.9	23.4	3.5	1.9	28.8
9	1966	24.6	21.4	3.2	1.4	26.6

Source: See next page

App. 7.6 Distribution of Households in Ethiopia by Strata and Urban and Nomadic Populations Used in the Model of the Marketeable Surplus

SL No.	Year	LL	PP	LMP	UMP	MP	RP	Total	Urban	Nomadic	Total
1	1980	-	1,980	1,742	682	2,424	81	4,485	562	671	5,718
2	1979	-	1,936	1,700	666	2,366	74	4,376	531	656	5,563
3	1978	-	1,915	1,682	659	2,341	74	4,330	500	656	5,486
4	1977	-	1,778	1,600	732	2,332	188	4,298	453	640	5,391
5	1976	-	1,872	1,359	704	2,063	222	4,157	438	625	5,220
6	1975	523	1,534	1,221	552	1,773	264	4,094	406	609	5,109
7	1970	399	1,806	997	212	1,209	242	3,656	297	547	4,500
8	1966	381	1,776	955	196	1,151	36	3,344	219	500	4,063

Source: PMGSE Census 1984, 1985, pp.8-12

CHAPTER SIX

CONCLUSION

In this thesis our concern has been with the analysis of the nature of agrarian transition in poor countries, the likely role of the new technology in this process. In the discussion of the pre-new technology period agrarian structure, we tried to establish the variance and the commonality of the agrarian systems of the South and North. We demeonstrated the inadequacy of tenancy as a measure of stratification within the peasantry. We identified absentee "proto" landlords, resident proto-landlord cum rich peasants, the peasantry and the marginal peasants in the three agrarian systems that we conceptualized for the analysis of the Ethiopian agrarian economy as a whole. The size of the agricultural surplus and its potential for accumulation within and outside agriculture and its dynamism were limited by the low level of the productive forces on the one hand and the external linkage of the largely obligatory surplus from poor and middle peasantry through imports for consumption goods and urban dwellings. We estimated the home market for non-agricultural goods and services in the agrarian economy to have been well below 5% of the national gross product in the immediately pre-technology period of 1966.

Having tackled the global and macroeconomic framework of the agrarian economy of Ethiopia, we proceeded to the first fully empirical chapter, where we dealt with a comparison of the new technology period resource use and productivity in the 'land surplus' Arsi agrarian economy. Using a partial correlation coefficient model, we tested Chayanov's hypotheses

of high correlation between farm family income and demographic variables to infer policy implications in the context of agrarian transitions. They were, however, found not to hold true in most cases. When they did, it was mostly in the pre-new technology period surveyed villages. Even in these villages, however, they break down when the proxies used for the demographic variables are controlled for land and oxen services. There appears also to be no conclusive evidence to support Chayanov's thesis of a significant correlation between his main factors accounting for variations in incomes (labour supply, land productivity) and the demographic variables - consumer unit and consumer worker ratio. The inverse relation between net sown area and output per net sown area was observed in the pre-technology villages. In the post-new technology period, with higher working capital per hectare and improved management, the relationship is positive and significant in most cases.

The most consistent, positive and significantly correlated resources with proxies of income were the Leninist classifying variables of oxen and land in the pre-technology period. These variables (oxen, land and the new technology inputs) are not to any significant level related to the demographic factors. The microlevel significance of oxen as the basis of the exploitation of labour is strengthened by its land and labour productivity enhancing effect, bringing to the fore its centrality in redistributive and socialization measures in Ethiopian agriculture. The implication of the reversed inverse relation between output per hectare and net sown area within holding sizes operated by mainly family labour

suggests the negative output effect of the fragmentation of holdings in drawing strategies of institutional change in agriculture.

The next empirical chapter focused upon the change in production relations, the disposal of production into consumption, obligatory surplus and commercial surplus induced by the new technology. The basis for a wide prospect for agrarian transition was suggested. Given a profitable leap in technology, the case of Arsi demonstrates a real breakthrough in overcoming the initial low level of the productive forces both through increased productivity and a considerable expansion of the land frontier in rainfed agriculture. The diffusion of the technology, the peasantization of the hitherto semi-nomadic population, the trend towards the differentiation of the pre-technology period peasantry, the formation of capital by mechanized farmers from "above", and the emergent rich peasant set the basis for a rapid transition of Arsi agriculture. The more than doubling of output and the estimated change in the share of the marketable surplus from 27 to 70% of the output (with nearly 3/4 of this achieved as commercial surplus) in just eight years and most of it by the peasantry itself suggests the basis of the rapid change in output and the prospect for accumulation in land surplus agrarian economies such as Arsi, given initial investments (research, road, new inputs).

Given the right strategies to further deepen capital from the new technology, the expansion of the land frontier, provision of incentive goods, maintenance of the balance between accumulation at farm and national level and the

distribution of the increased productivity in the stabilization of prices for the consumers and incomes for the producers, it demonstrated the potential that exists for a mutually self sustaining development process between agriculture and non-agriculture. This is so especially in the context of laying the basis for a transition towards a socialist agriculture with a planned programme of industrialization. Analysis of output, the distribution of incomes and terms of trade within the context of a development strategy seeking to prompte equity and accumulation, suggested a consolidationist rather than redistributivist agrarian reform, to capture the gains of the technology and to further the productive base of the agrarian economy.

In chapter five, a discussion of the agrarian reform and the new technology in Ethiopia as a whole showed that redistributive agrarian reform, the remission of rent, its replacement by a regressive tax but in aggregate lower land use fee and the spread of the new technology inputs significantly enhanced the income and the political position of the middle peasantry. Concurrently, however, given the pre-reform numerical dominance of poor peasants (leading to a fall in the average holding size), the regressive nature of the new tax, the possible shrinkage of the rural labour market and a dramatic rise in the low season relative price of cereals, (especially the coarse ones purchased by the poor), the poor peasantry's level of welfare appears to have declined compared to the pre-reform period.

According to the simple model we build, with the

higher level of the disposable cereal income for consumption by all sections of the peasantry made possible by the remission of rent, the supply of the aggregate marketable surplus increased by more than the estimated urban and rural effective consumption demand. This was mainly accounted for by the output increasing effect of the new technology. However, despite further increase in the marketable surplus from state farms, the Addis Ababa wholesale price of cereals exceeded the overall levels of inflation of the economy as a whole - the increase being more pronounced among the coarse cereals consumed by the rural and the urban poor with little or no part of it passed to the producers.

Our analysis in chapter five showed the relatively high uptake of the new technology inputs by the peasantry increasing the marketable supply of cereals without commensurate price incentive but at the same time a high transfer of surplus from the urban consumers and proportionately more from the poorer sections. Accumulation of the surplus thus obtained as merchant capital (given the restriction on private investment in holdings greater than 10 hectares) indicated massive trading surplus by the State and merchants not channelled to expand the productive base of the agrarian economy.

We concluded the chapter by arguing that the post-reform agrarian structure of middle peasantization (petty commodity production) and large marketing surplus by the State and merchants at the expense of the urban and the rural poor meet neither the distributive nor accumulation objectives of development. Given the pre-revolutionary non-capitalist and non-feudal social formations, the Ethiopian

experience in radical redistributivist agrarian reform and the new technology within a macro 'land surplus' agrarian economy pose several problems in the realm of politics, pricing, institutional planning, marketing and accumulation strategies towards a non-capitalist agrarian transition.

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